

Mining

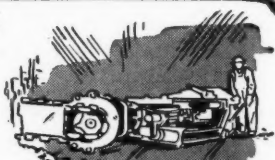
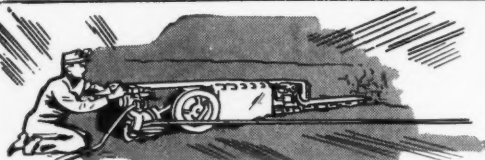
CONGRESS JOURNAL



APRIL
1946



Looking to **COAL'S FUTURE**



ESTD
1911

Coal Mining News

1941
11.10

KENNAMETAL UNDERCUT- TER BITS CUT 35 PLACES (before regrinding) WHERE OTHER BITS AVERAGED ONLY 1

The above information pertains to operations in which
investigation or actual production in underground
production was made in the last 100 days of 1940.



35 places cut between resharpenings through coal having clay veins—that's the average performance of Kennametal Bits in just one Pennsylvania coal mine. Furthermore, in nearby areas, where the face is clean, Kennametal Bits are cutting up to 250 places between resharpenings!

Before Kennametal Bits were used, operations in the mine had been seriously delayed because the previously used bits could cut, on the average, only one place, and then would have to be removed from the chain.

Why do Kennametal Bits make cutting-in operations practicable where previously the cost was prohibitive?

Why do they retain their edge, and cut far more footage?

Because the cutting edge is Kennametal—the tough, durable tool material that is exceptionally hard (75 Rockwell C compared to 66 for hardest tool steels).

What do Kennametal Bits cost?

Their first cost is higher than that of other bits, but their ultimate cost is insignificant, taking into consideration the economies effected through their use.

Want to increase the productivity of your mining machines, and their crews?

Test Kennametal Bits under your operating conditions—and compare results. A note from you brings catalog particulars and prices, or our mining engineer—which ever you say.

CHAINS FOR WHICH KENNAMETAL UNDERCUTTER BITS ARE DESIGNED

U1	U2	U3	U4
Short or Longwall Machines	Number 50, 52, 54 Chains	Mid. Track or Rubber-Tired Gage	Mid. Track or Rubber-Tired Gage
Cincinnati Goodman Jeffrey Prox Sullivan Tracy	..... Goodman Prox Sullivan Tracy	Cincinnati Goodman Jeffrey Prox Sullivan Tracy	Cincinnati Goodman Jeffrey Prox Sullivan Tracy

Also Available

Six sizes of two-way Kennametal-tipped drill bits—1 3/8", 1 3/4", 1 7/8", 2 1/4", 2 3/4", and 3"—to increase production rates and reduce costs of mechanical drilling operations. Solid, that minimize whip, and make fullest use of the advantages inherent in Kennametal-tipped Drills, are made by us for use with all six sizes of bits.



KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

Mining

CONGRESS JOURNAL

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FRONT COVER: Aerial View of a Colliery in Pennsylvania.

—Photo U. S. Bureau of Mines.

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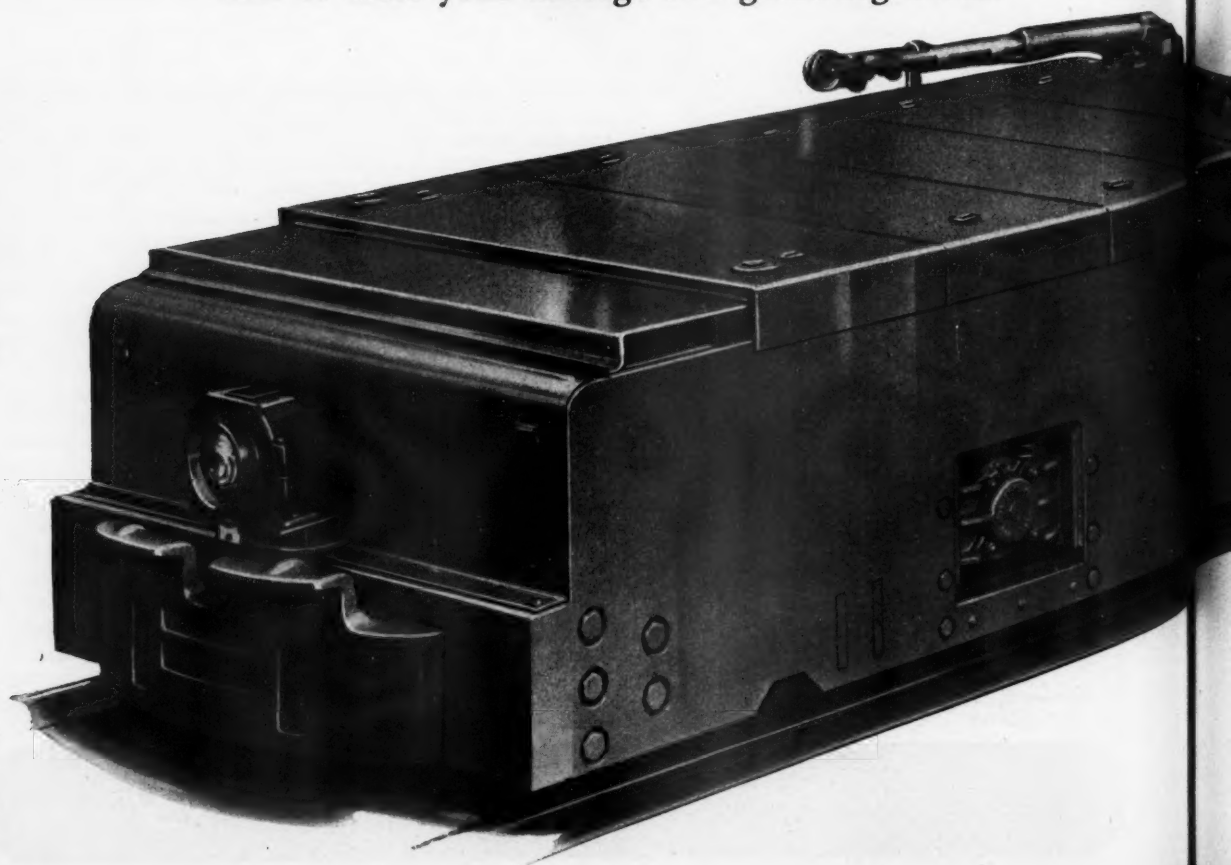
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Secretary



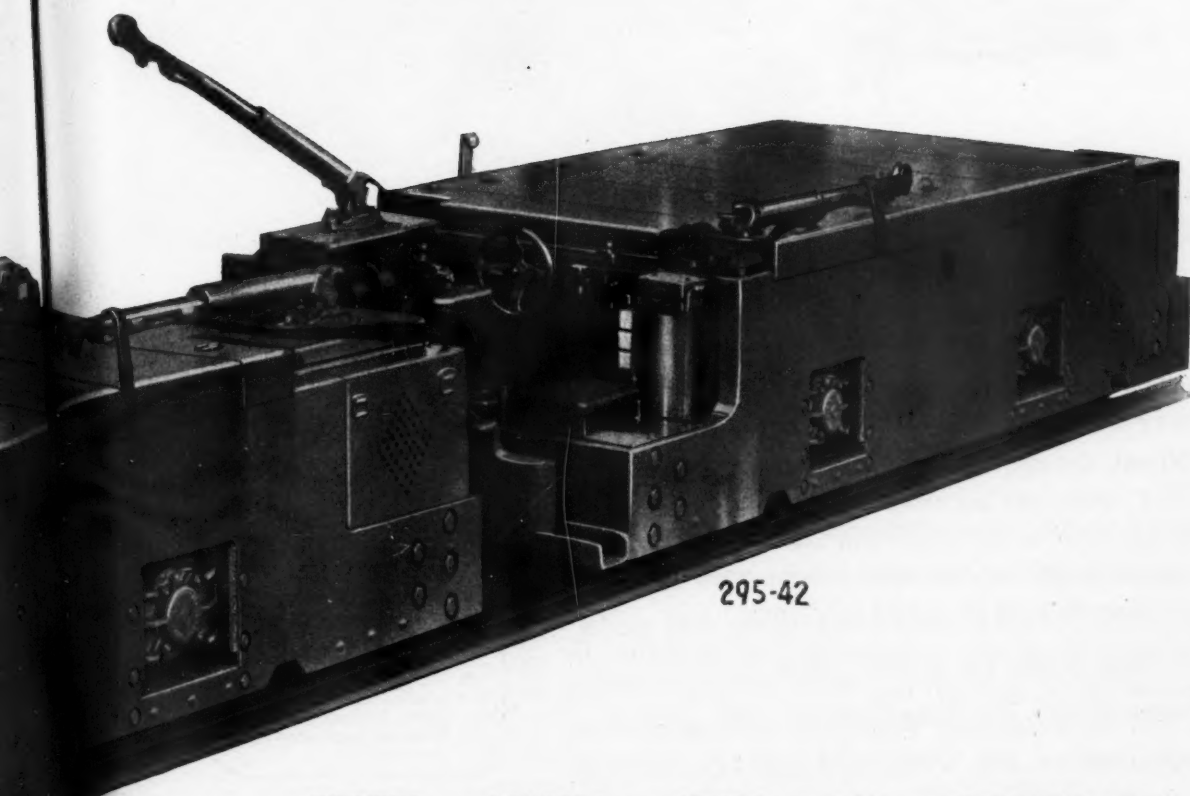
JEFFREY

LO

● Illustrating a Jeffrey tandem locomotive for handling greater tonnages—easier—faster. Heavy duty, rugged Jeffrey locomotives like these, teamed with equally dependable Jeffrey gathering locomotives are performing a major service in transporting coal from working face to preparation plant in hundreds of mines. There's a Jeffrey locomotive in a type and size to meet your haulage and gathering needs.



HAULAGE LOCOMOTIVES



295-42

CUTTERS • LOADERS • DRILLS • JIGS • UNDERGROUND
CONVEYORS • LOCOMOTIVES • FANS • BLOWERS
TIPPLES AND TIPPLE EQUIPMENT • FEEDERS • CRUSHERS
CONVEYORS • CHAINS AND TRANSMISSION MACHINERY

The Jeffrey Manufacturing Company
958-99 North Fourth Street

Columbus

16

Ohio

BLACK DIAMONDS



MINE MORE WITH **WHEAT** THE *productive* CAP LAMP

It is a proven fact that light and productivity go hand in hand. Especially is this true underground where more and better light always means *more and better production—with a far greater margin of safety.*

Wheat, the *approved* cap lamp can actually *reduce fatigue, lower the accident rate and raise the output level as much as 20% per man day!* Even at the end of the shift Wheat remains bright and maintains more than 80% of its initial efficiency.

Because these are dollar-producing facts that no mine owner or operator can afford to ignore, it will pay you to investigate Wheat—the *productive* cap lamp—now.

WHEAT GIVES YOU THESE EXCLUSIVE BENEFITS

1. 20% Brighter light at working face.
2. Compact, lightweight, balanced, streamlined.
3. Steady, dependable light; 80% efficient at the end of shift.
4. Emergency bulb means miner is never in the dark.
5. Simple, fool-proof, self-service charging system—battery charged through headpiece and cord of lamp.

KOEHLER — THE FIRST LAMP APPROVED BY THE U. S. BUREAU OF MINES

Write today—
**WHEAT LAMP
SALES CO.**

1801 Kanawha Valley Bldg.
Charleston W. Va.

**MANUFACTURED BY
KOEHLER MFG. CO.**
MARLBORO, MASS.

**SPECIALISTS IN MINE LIGHTING
FOR MORE THAN 30 YEARS**

KOEHLER SAFETY LAMP



RUGGED - DEPENDABLE
SENSITIVE

OTHER SALES REPRESENTATIVES

E. D. BULLARD CO.
San Francisco
Chicago
B. C. EQUIPMENT CO., LTD.
Vancouver, B. C.
H. C. BURTON & CO.
Hamilton, Ontario
OLDHAM & SON, LTD.
Manchester, England

a.c.f.



"TOPS" IN DROP BOTTOMS! ★

The unloading operation in a.c.f. Drop-Bottom Mine Cars is automatic—smooth in operation—without stopping the progress of the train. Cars moving with interruption, bring out a lot more coal and at lower per ton! All-welded end sill construction and double action spring bumpers are only a few of the many exclusive features of a.c.f. Mine Cars. Ask our Sales Representative to demonstrate the reasons why a.c.f. "Tops" in Drop Bottoms!

a.c.f.

AMERICAN CAR AND FOUNDRY COMPANY

New York • Chicago • Philadelphia • St. Louis • Cleveland
Berwick, Pa. • Pittsburgh • Huntington, W. Va.



In building access roads, in stripping overburden, in moving spoil banks, tailings or culm—and in ore removal—the matchless operating economy of International Diesel Tractors increases the profits of mining.

Traction power that masters any terrain—power to lift, dig and carry even under adverse conditions—power that's quickly available wherever you need it, in any kind of weather, from drawbars or take-off shafts—that's what you get when you standardize on International Diesel Crawlers for the many jobs they do.

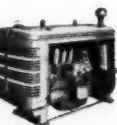
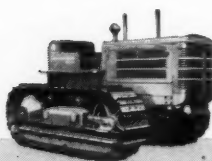
Instant starting, full-Diesel engines with unexcelled capacities for work. Sturdy construction, excellent balance, superior track assemblies, matchless service accessibility. These are points your nearest International Industrial Power Distributor will explain and demonstrate to prove the advantages you can gain with International Diesels. Call him or see him now.

Industrial Power Division

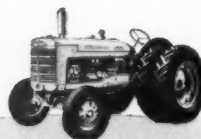
INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue
Chicago 1, Illinois

TRACTORS



POWER UNITS



WHEEL TRACTORS

INTERNATIONAL



Industrial Power

Time and Money-Saving Features OF BOWDIL **FABRI-FORGED** CUTTER BARS AND CHAINS



Rivet lock principle assembles quickly, holds securely.

Shoulders on lugs and links carry the load . . . lengthen chain life.



CONVENTIONAL



BOWDIL

Write for complete information contained in Bowdil's folder "Another Step Ahead." We will be glad to present cost saving facts.

WIDE WEARING STRIPS INSURE SMOOTH, WOBBLE-FREE RUN

NOW—ready for immediate delivery—Bowdil presents advanced equipment to meet modern needs economically. The shoulders on the lugs and links, plus the wider wearing strips on the bar greatly speed and improve cutting operations by:

1. Increasing bearing surfaces
2. Reducing leverages over $\frac{1}{2}$
3. Stabilizing deflection

With Bowdil's famous Concave Cutter Bits in the holders, this equipment will definitely prove operating economy for you.

BOWDIL

COAL CUTTING EQUIPMENT
CANTON OHIO



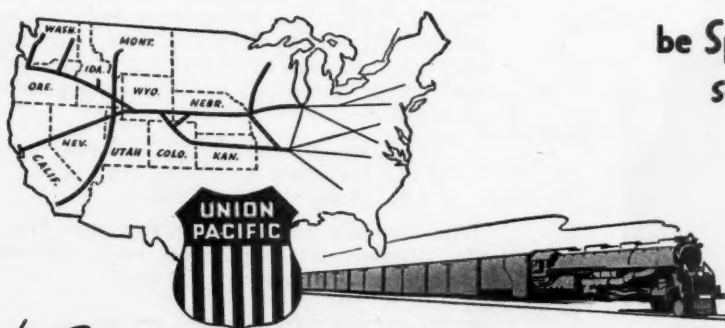
Pictured above is another reason why Union Pacific can maintain fast schedules. It's one of the "Big Boys," 600-ton super-powered freight locomotives designed to meet industry's heaviest demands.

But it takes more than horsepower to keep shipments rolling on schedule. The "know how" of many thousands of trained Union Pacific employees . . . the

time-saving Strategic Middle Route uniting the East with the West Coast . . . are *plus* advantages only Union Pacific provides.

Union Pacific traffic experts are located in metropolitan cities from coast to coast. Call on them to assist in solving your transportation problems.

For efficient, dependable freight service—



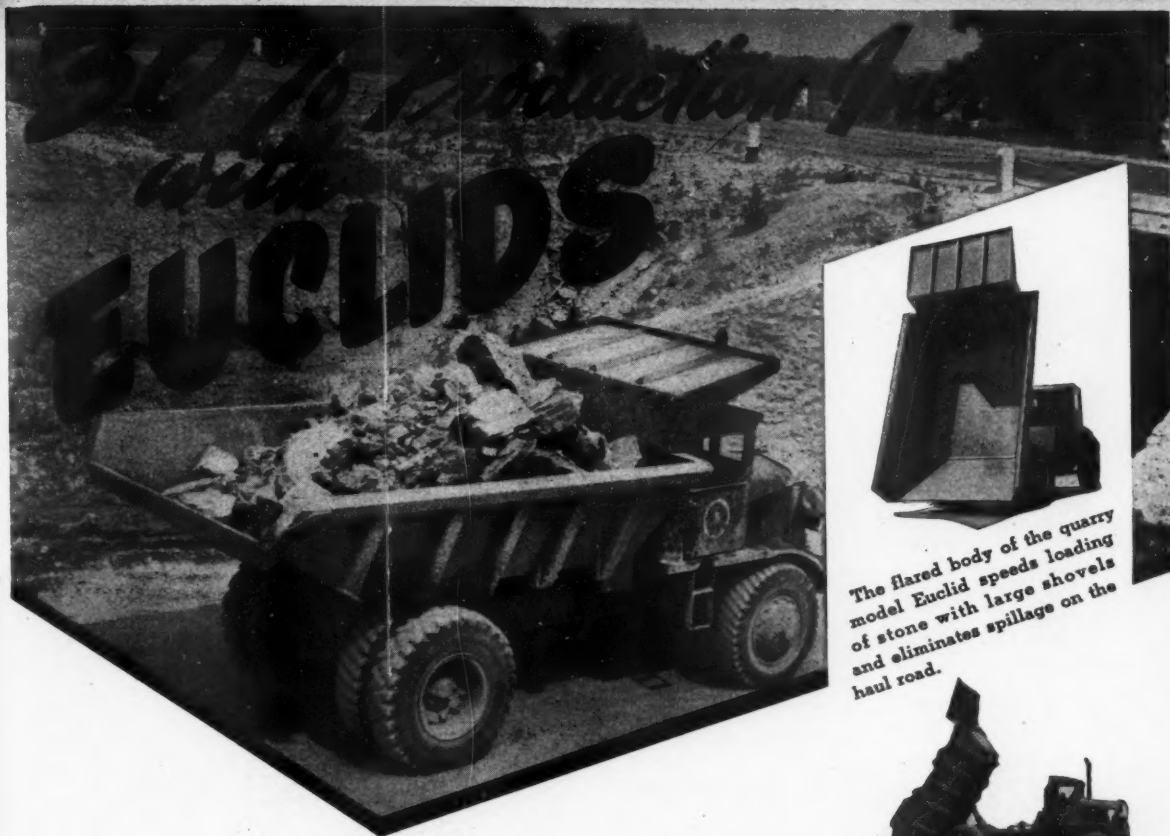
be Specific —
say "Union Pacific"

★ Union Pacific will, upon request, gladly furnish industrial or mercantile concerns with information regarding available sites having trackage facilities in the territory it serves. Address Union Pacific Railroad, Omaha, Nebraska.

The Progressive

UNION PACIFIC RAILROAD

The Strategic Middle Route



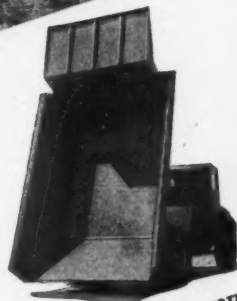
● After more than 40 years of quarry operation by rail, The Bessemer Limestone and Cement Co. converted its haulage system to heavy duty trucks thereby achieving a production increase of approximately 30%. The job involves removal of overburden and delivery of blasted rock to a crushing plant. At this quarry in western Pennsylvania, Bessemer operates 5 Quarry Type Rear-Dump Euclids.

After receiving a 15-ton load from a 5 cu. yd. shovel, the Euclids travel 6500 feet to the crushing plant at an average speed of 12.3 m.p.h. Total round trip time averages 13 minutes — better than 4 trips per hour.

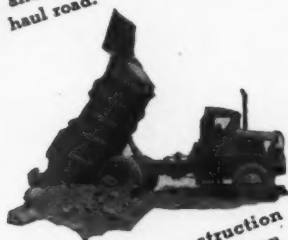
The flexibility of truck haulage over constantly changing roads has resulted in lower costs and increased production. For overburden removal, too, Euclids have proved their efficiency and dependability.

Have you investigated the possibilities of Euclids for your own operations? Your distributor can supply helpful information and literature.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO



The flared body of the quarry model Euclid speeds loading of stone with large shovels and eliminates spillage on the haul road.



Tapered chute construction and high dumping angle mean quick, clean shedding of the load — save time in dumping.

★
**EUCLID
EARTH MOVERS**

Rear-Dump Euclids

Capacities of 18 to 22 tons — 9.2 to 20.7 cu. yds., struck... loaded top speeds of 22 to 38 m.p.h.... powered by 180 to 275 h.p. Diesel engines.

Bottom-Dump Euclids

Capacities of 20 to 32 tons — 13 to 42.9 cu. yds., struck... loaded speeds from 26 to 34.4 m.p.h.... powered by 180 to 275 h.p. Diesel engines.

Euclid Loader

Fast loading of hauling equipment... makes shallow cuts to 9'6" wide... maximum cutting depth of 24"... 54" belt powered by 150 h.p. engine.

EUCLID

**SELF-POWERED
HAULING EQUIPMENT**

For EARTH ROCK COAL ORE



and now—
HYDRAULIC STEERING
for JOY Shuttle Cars

EASIER OPERATION
SHORTER TURNS



4 WHEEL HYDRAULIC STEERING

All four wheels turn in this sensational new Joy Shuttle Car, acclaimed by engineers as a crowning achievement in mine haulage engineering. Turns the sharpest corners with half the effort . . . smoothly, easily by a one-handed twist of the steering wheel. Hydraulic steering reduces driver fatigue!

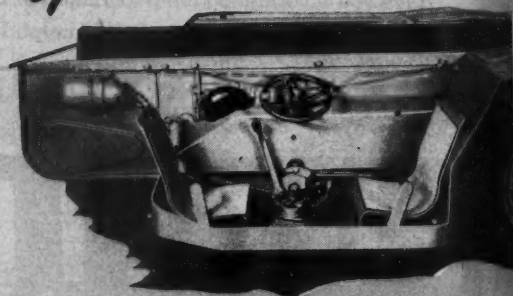


*Joy Engineering Provides
Greater Comfort for Operator*

The smaller steering wheel, located at the right of the driver, permits greater leg room. Spring steel seats, with foam rubber cushions add further to comfort.

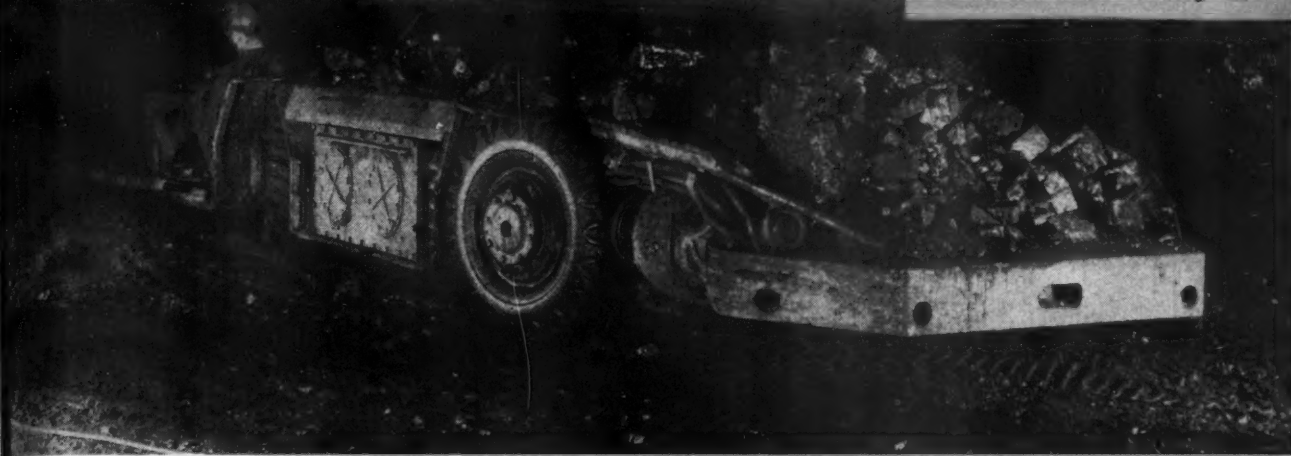
4 WHEEL DRIVE

Better performance, more tractive effort with shorter turning radius is the big feature of the Joy 4 wheel drive. Adapted from the four-wheel military vehicles, this simplified wheel articulation design has been thoroughly proved in Army Trucks and Heavy Duty Distribution Units under heaviest military loads.

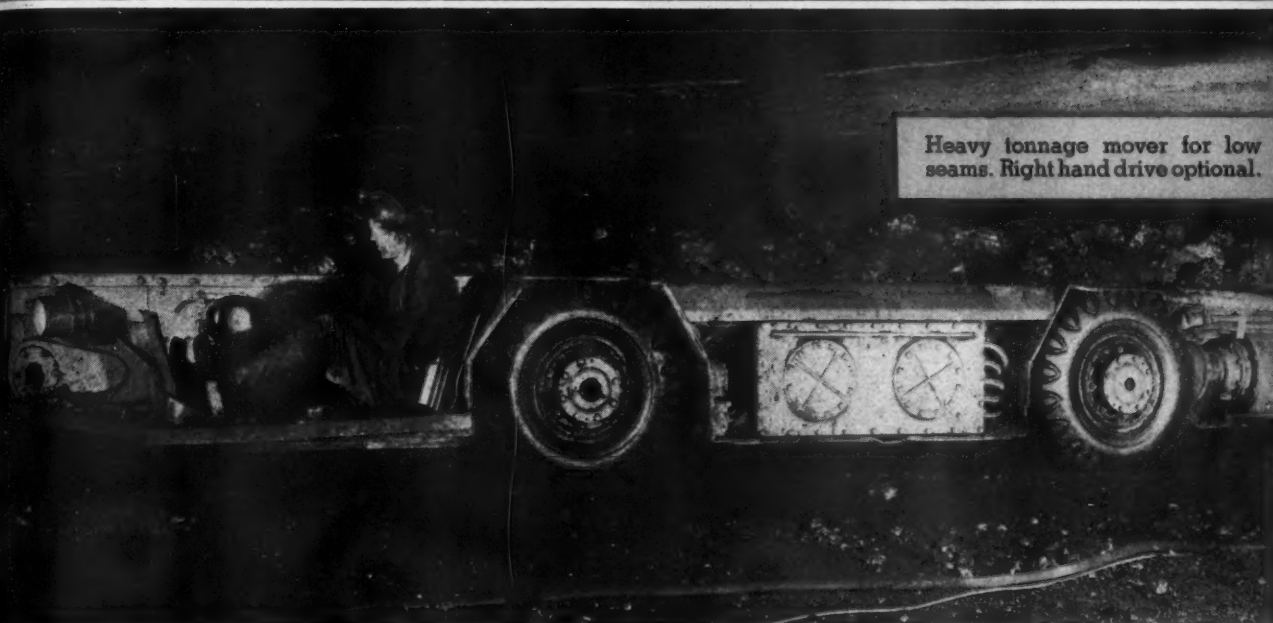


JOY Manufacturing Co.

Rear view of Joy 6SC Shuttle Car shows low wide loading end.

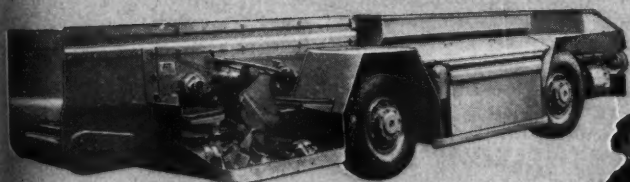


Heavy tonnage mover for low seams. Right hand drive optional.



AVAILABLE IN TWO JOY MODELS

5SC (42" high) and 6SC (31" high)



Eight foot wheel base; manual or hydraulic drive; battery or cable reel; high elevated discharge end optional.



Cable reel only; fixed discharge, low or high; sideboards can be added; capacity three tons.



Call in a Joy Engineer-

0. FRANKLIN, PA.

NOW...every B.C.I. a
to the C
SELLS COAL
HOME



TO MAKE DREAM HOMES COME TRUE

America, always a home-loving land, now readies herself to move into wondrous new homes whose comforts and conveniences will match those of any air castle of the mind... Homes where many of the household chores will be performed by the push of a button... Homes whose indoor climate will equal the best that nature has to offer... Homes whose rooms will be healthfully warmed by the steady, uniform flow of automatic coal heat.

Coal... the Modern Fuel

Bituminous Coal has long been valued as the most economical, most dependable of all home-heating fuels. That's one reason why more than 4 out of every 7 homes in the U. S. already heat with coal. And today, with the develop-

ment of marvelously efficient new stokers to suit the needs of any size of home, Bituminous Coal also becomes the modern fuel—completely automatic, even to the point of ash removal—clean, quiet, odorless, smokeless!

Coal... the Plentiful Fuel

Thanks to the unlimited bounty of nature, America boasts a 3,000-year treasure trove of Bituminous Coal. What more satisfying assurance could any new-home builder have that his coal supply will always be available—will always be low in cost, no matter how high the prices of other fuels may climb?

BITUMINOUS COAL INSTITUTE
60 East 42nd Street, New York 17, N. Y.

BITUMINOUS COAL...LIGHTS THE WAY...FUELS THE FIRES...POWERS

BITUMINOUS COAL...LIGHTS THE WAY...FUELS THE FIRES...

L advertisement e General Public L FOR E HEATING!



Backing up the business of every retail coal dealer, a forceful message on home heating is now included in every Bituminous Coal Institute advertisement to the general public.

Running in full color in the *Saturday Evening Post* and *Liberty* . . . and in black and white in *Newsweek*, circulated to newspaper editors in *Editor & Publisher* and *National Publisher* . . . these full-page advertisements are illustrated by the world-renowned painter, Rockwell Kent. In the advertisement at the left, coal heat for homes is the main theme of the copy. All advertisements in this series feature the advantages of coal and modern coal-burning equipment for home heating.

With the rest of the Bituminous Coal Institute's broad program of advertising and publicity, this campaign is telling a story that needs telling—telling it to the people who determine the future of the entire coal industry.

BITUMINOUS COAL INSTITUTE

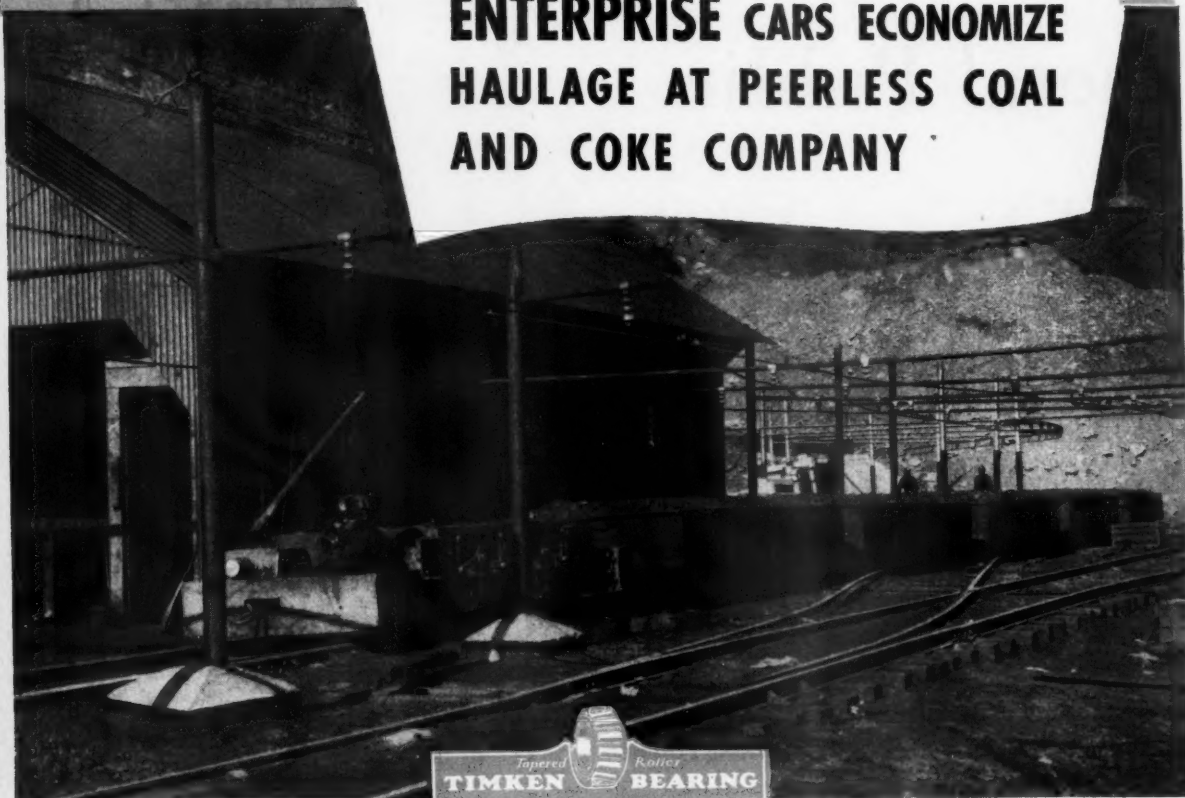
60 East 42nd Street, New York 17, N. Y.

These Operators Make Possible the Progressive Program of the B.C.I.

Algoma Coal & Coke Co.
American Coal Co.
Anchor Coal Co.
Atlantic Smokeless Coal Co.
Ayrshire Collieries Corp.
Barnes & Tucker Co.
Bellingham Coal Mines
Berwind White Coal Mining Co.
Boone County Coal Corp.
Central Indiana Coal Co.
Chicago, Wilmington & Franklin Coal Co.
Clinchfield Coal Corp.
Clover Splint Coal Co., Inc.
Columbus Mining Co.
Consolidation Coal Co.
Crab Orchard Improvement Co.
Crowe Coal Co.
Crozer Coal & Coke Co.
Cumberland Coal Co.
Darr Smokeless Coal Co.
De Bardeleben Coal Corp.
Delta Coal Mining Co.
Donegan Coal & Coke Co.
Eagle Cherokee Coal Mining Co.
Enos Coal Mining Co.
Gay Coal & Coke Co.
Gay Mining Co.
Hanna Coal Co.
Hart Coal Co.
Harvey Coal Corp.
Hume-Sinclair Coal Mining Co.
Huntsville-Sinclair Mining Co.
Imperial Smokeless Coal Co.
Island Creek Coal Co.
Jamison Coal & Coke Co.
Jefferson Coal Co.
Jewel Ridge Coal Co.
Knott Coal Corp.
Koppers Coal Division
Little John Coal Co.
Lorado Coal Mining Co.
Loraine Coal & Dock Co.
Loyal Hanna Coal & Coke Co.
Marianna Smokeless Coal Co.
Marigold Coal Mining Co.
Mill Creek Coal & Coke Co.
Monitor Coal & Coke Co.
Morrisdale Coal Mining Co.
New River Co.
New York Coal Co.
Page Coal & Coke Co.
Peerless Coal & Coke Co.
Pittsburgh Coal Co.
Pittsburgh & Midway Coal Mining Co.
Pocahontas Corporation
Pocahontas Fuel Co., Inc.
Pond Creek Pocahontas Co.
Powhatan Mining Co.
Red Jacket Coal Corp.
Sahara Coal Co.
Seneca Coal & Coke Co.
Sentry Coal Mining Co.
Sooner Coal Mining Co.
South-East Coal Co.
Sovereign Pocahontas Co.
Standard Coal Co.
Stonega Coke & Coal Co.
Tierney Mining Co.
Truax-Traer Coal Co.
Turkey Gap Coal & Coke Co.
Valley Camp Coal Co.
West Kentucky Coal Co.
Westmoreland Coal Co.
West Virginia Coal & Coke Co.
Youghiogheny & Ohio Coal Co.

POWERS THE PROGRESS OF AMERICA

Timken Bearing Equipped— ENTERPRISE CARS ECONOMIZE HAULAGE AT PEERLESS COAL AND COKE COMPANY



When the Peerless Coal and Coke Company, Vivian, West Virginia—for more than fifty years an active producer in the Pocahontas field—recently opened the new mine in the No. 4 Pocahontas seam shown in the photograph, they had practically no obsolete equipment problem.

From the beginning of operations, they were able to install modern coal handling equipment thought to be best suited to their requirements. Cars haul the coal from mine to dump; an underground belt conveyor system conveys the coal from dump to cleaning plant.

The cars selected for this mine are all-steel, four axle type cars measuring 16 feet long by 7 feet wide, built by Enterprise Wheel & Car Corpora-

tion, Bristol, Tenn.-Va. There are 120 in service at the present time, all equipped with Timken Tapered Roller Bearings.

The selection of Timken Bearing Equipped cars for this mine was based upon the Peerless Coal and Coke Company's long and satisfactory experience with them in the original mine in the No. 3 Pocahontas seam. The belt conveyor system, 2900 feet long, also is equipped with Timken Bearings.

More than 1,000 mine operators know it pays to operate Timken Bearing Equipped cars. Specify Timken Bearings on your next car order—and make sure the trade-mark "TIMKEN" is stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

THE COAL SIZER

*that's "geared"
to the market*

Link-Belt 2-roll Sizer features Mechanical Roll Adjuster

From all angles the Link-Belt 2-Roll coal sizer is an outstanding investment.

ECONOMICAL: "Variations in market requirements require frequent changes in the size of our crushed product. The Link-Belt mechanism for quick adjustment allows us to make these changes without appreciable delay. Your sizer is a very practical machine for our purpose in sizing ma-

terial received in our crushing plant"—large operator.

MECHANICAL: Greater realization at less cost, through mechanical superiority (see list).

SERVICE LIFE: Many Link-Belt 2-Roll Sizers have been in service for years, with negligible maintenance.

Let us send you further information.

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 19, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8.

GREATER REALIZATION

- Coal cracks with minimum fine
- Less degradation and less over-size mean more premium size.
- Proper tooth design and spacing mean slow roll speed.
- Quick, accurate changes of roll spacing accomplished by push button control, or manually.
- Simple, compact design saves space
- Unbreakable, all-welded steel frame
- Quiet operation . . . lower power requirements . . . low maintenance cost.

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered,
Built and Backed by

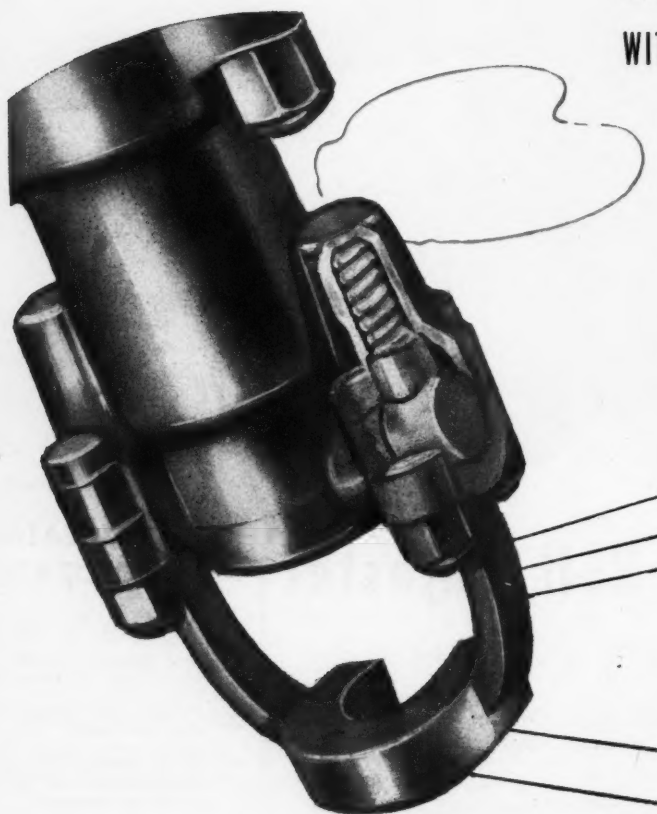


LINK-BELT

Why leading operators

The DRILL RUNNER knows that...

STEEL CHANGES ARE QUICK AND EASY
WITH THOR'S DIRT-PROOF, JAM PROOF
STEEL RETAINER



You won't find an operator of a Thor Rock Drill carrying a hammer or pry-bar to pound the retainer free for steel changes . . . because the Thor retainer is easily opened by hand throughout the life of the tool. Fully enclosed to prevent jamming by dirt or rock, the tension spring in the Thor retainer cannot be over-tightened. Lubrication is done without dismantling the retainer so it *always* works easily to speed steel changes and reduce friction and wear.

This feature alone makes Thor Rock Drills preferred by operators. Add smooth performance and easy handling and you'll see why runners get more footage per shift—every shift—with Thor.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham	Boston	Buffalo	Cleveland	Detroit	Los Angeles
Milwaukee	New York	Philadelphia	Pittsburgh	St. Louis	
Salt Lake City	San Francisco	Toronto, Canada	London, England		

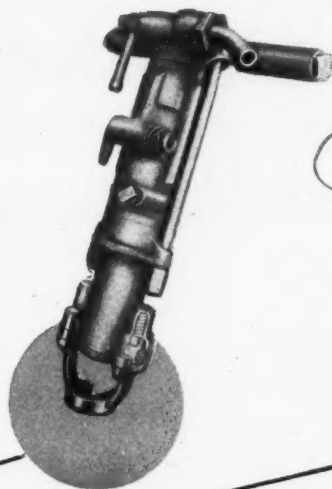
... **Thor** ...

PORTABLE POWER.

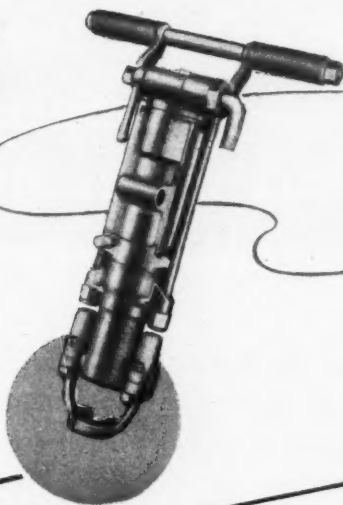
TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

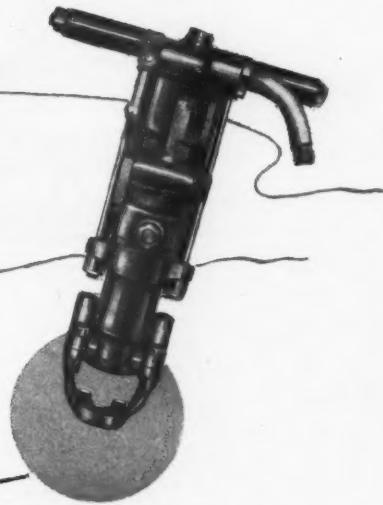
SPECIFY *Thor* ROCK DRILLS



Extra Light Weight—
No. 28. A new 30 lb.
machine for soft to me-
dium rock. Fast and
easy to handle.



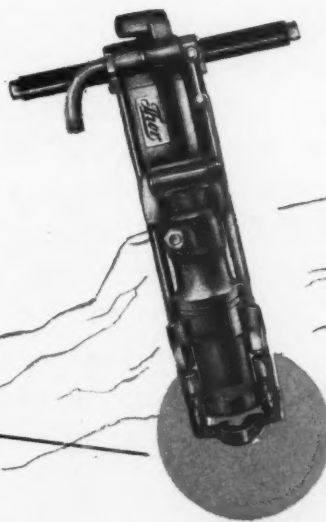
Light Weight—No. 33
A 39-pound drill espe-
cially developed for mines,
public utilities work and
other uses where excep-
tionally powerful rotation
is required. (steel retainer
optional)



Light Weight—No. 38.
A 44 pound, powerful,
general purpose machine
for medium drilling.



Medium Weight—No.
70 Series. 3 tools in the
55 pound class—power-
ful and fast for deep-hole
drilling in hard rock.



Heavy Duty—No. 85-B
An 80 pound machine
for deep drilling in the
hardest kind of rock for-
mations.



CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

FOR MORE AND BETTER OUTPUT

WITH ALL MECHANIZED EQUIPMENT

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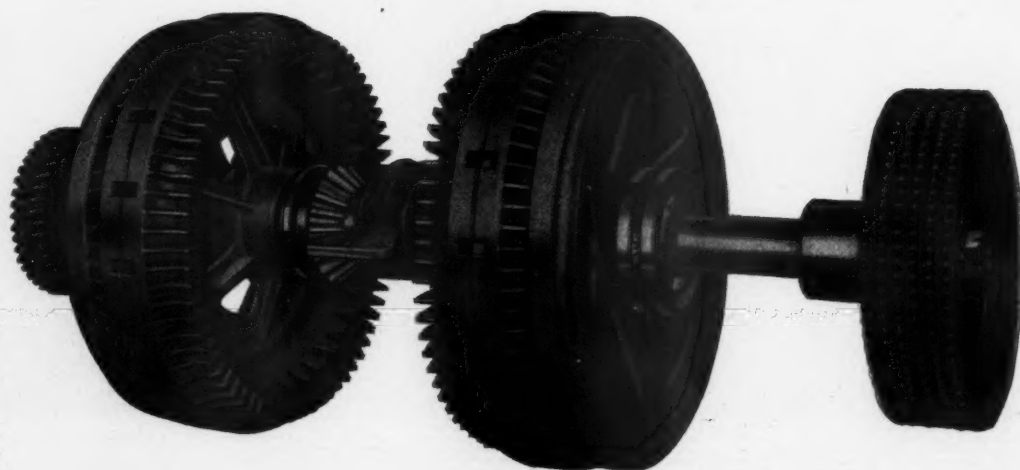
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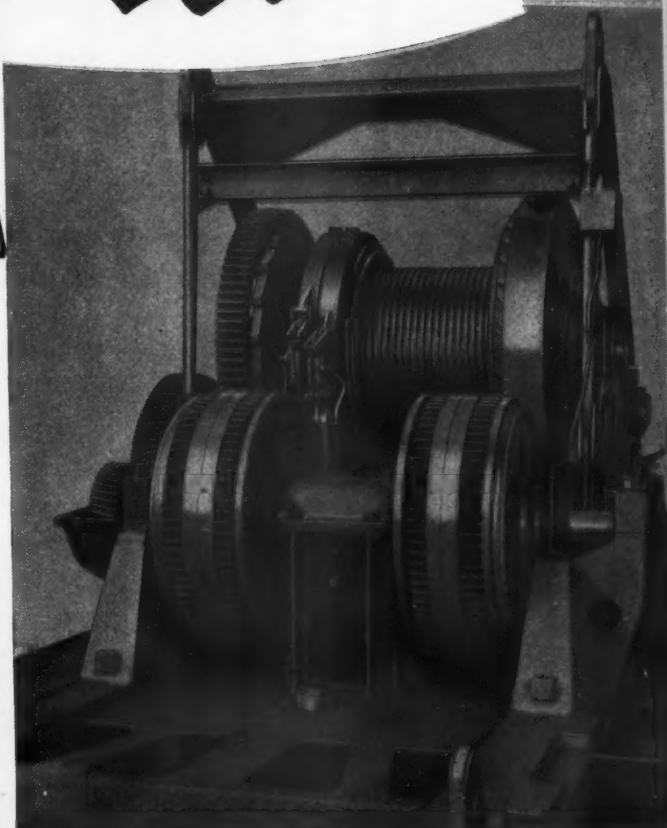
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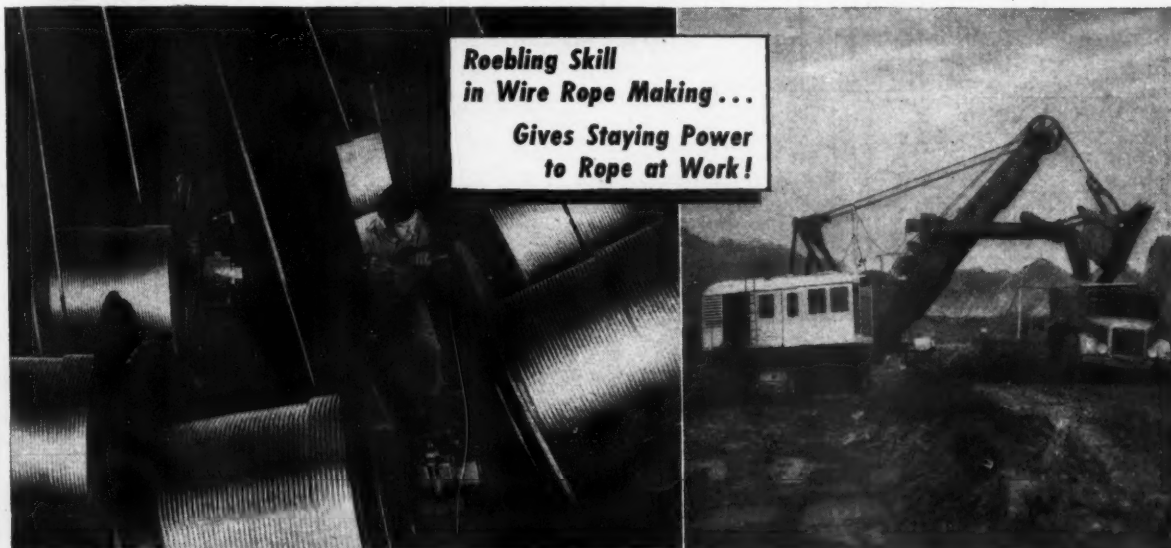
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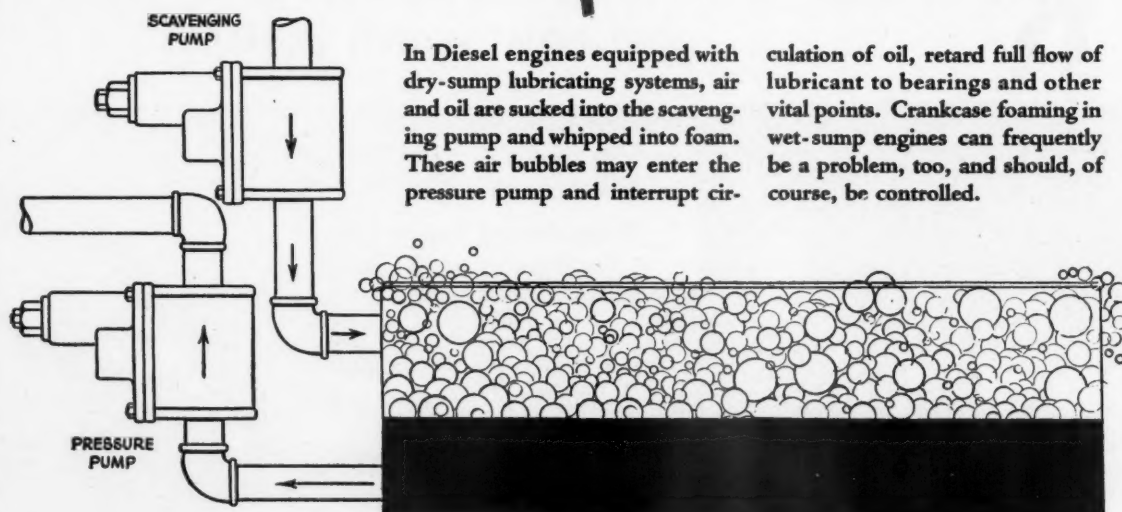


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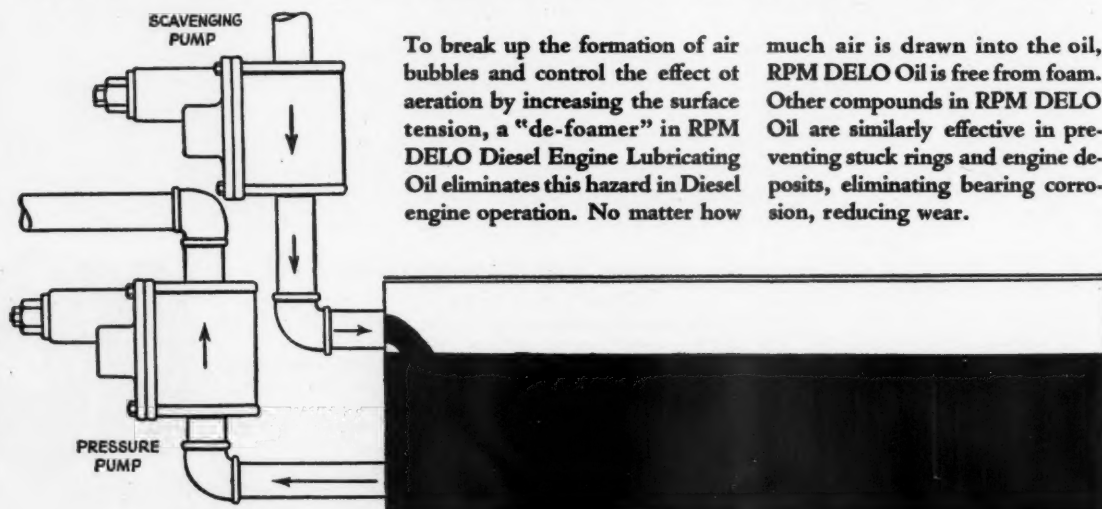
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[Page 22]



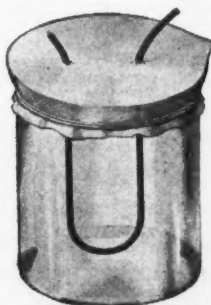


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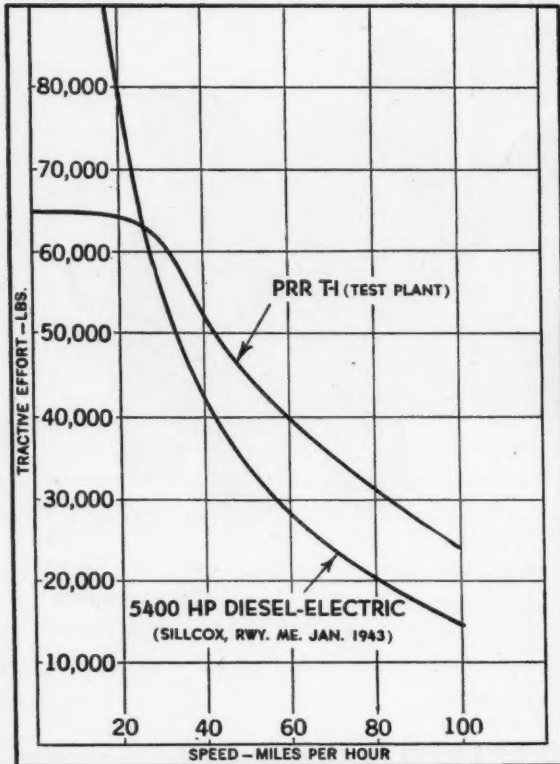


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From Paper by Ralph P. Johnson
Chief Engineer, Baldwin Locomotive Works,
before New York Railroad Club, May 17, 1945

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Courtesy of Engineering and Mining Journal



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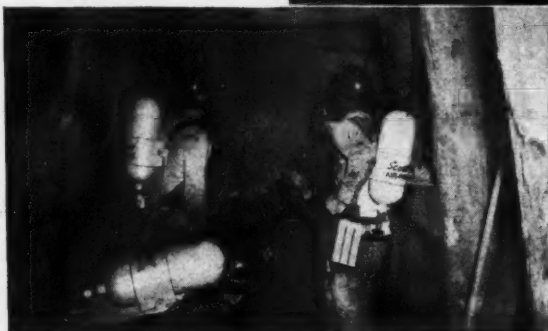
The Inside Picture Story of a Western Metal Mine Fire

Below:—Specialists on mine fire-fighting complete a fire brattice by guniting. Members of the crew expressed a preference for the Scott Air-Pak and its fresh, cool Certified Pure air supply.



Left:—Members of the crew of trained fire-fighters applying water to the hanging-wall side of the vein where smoke was discovered issuing from an old timbered raise. The Scott Air-Pak's ample air supply lent speed to the effort.

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The Dramatic Story of the Scott Air-Pak in Service

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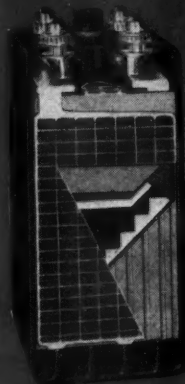
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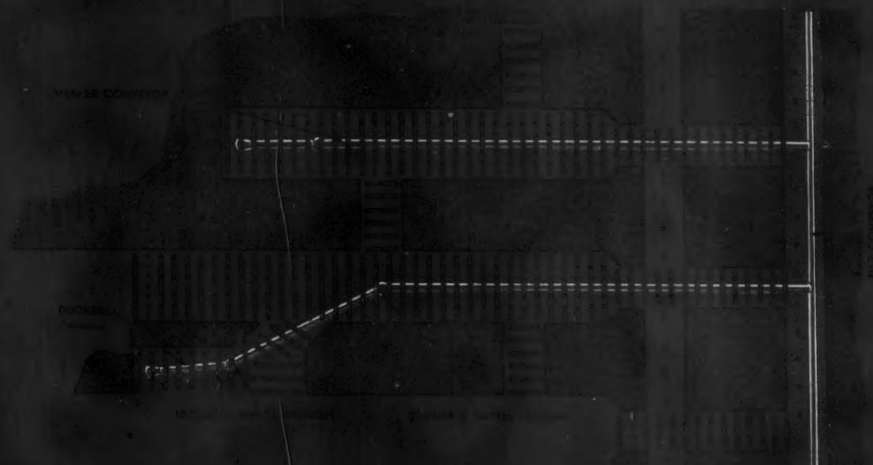
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System of Mining



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This is just one of many successful applications of Duckbill-Shaker Conveyors. Let us show you a plan to suit your mine.

A CONTINUOUS FLOW OF COAL FROM FACE TO MINE CAR



While the Duckbill is loading up at the left, cutting operations are underway at the right.




The heavy timbering at the lower part of picture above is necessary for the conveyor.


GOODMAN MANUFACTURING COMPANY

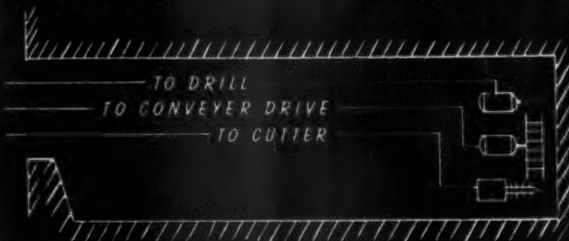
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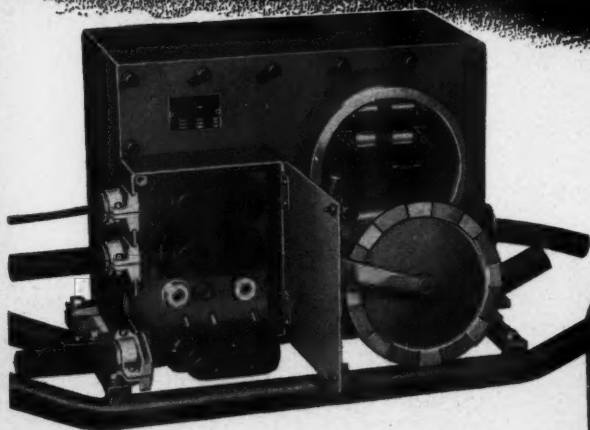
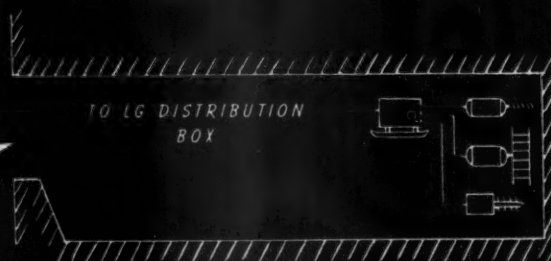
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★ Editorial ★

JULIAN W. FEISS, Editor

April, 1946

"Hitting Below The Belt"

AT the March 18 session of the Bituminous Coal Wage Conference at Washington, Harry M. Moses presented concrete facts refuting John L. Lewis' accusation that the coal industry has neglected safety precautions.

Unfortunately Mr. Moses' reply has not received publicity equivalent to that given to the statements made by Mr. Lewis. At one point in his address Mr. Moses stated "These men who sit before you (officials of the U.M.W.A.) know full well the great technical advances in our safety programs in the 14-year period selected by them. They know of the improved conditions of ventilation, rock dusting, explosion-proof equipment, new mining design, sprinkling systems, improved lighting, transportation, protective personal equipment and many other innovations designed entirely for safety adopted by the operators not only without assistance from the U.M.W.A. but many times against their violent opposition. The safety history of the industry is replete with strikes, legislative battles, and plain refusals of the Mine Workers to accept closed lights, smoking regulations, safety hats and shoes, new rules or any rules, whose only purpose was the safety of the employe. Attempts by management to discipline the employes for flagrant violation of safety rules, practices and laws endangering themselves and many others are more often than not resisted by the Union."

Aside from the novelty of Lewis appearing bedecked with a harp and halo, the incident would be humorous were not the subject so deadly serious. Far too many mine operators have experienced the difficulty of enforcing safety regulations against opposition from working groups. New safety measures are too often resisted by those for whom protection is designed.

There is no doubt that at some operations, particularly those working on a very close margin, there has been need of better safety practice in the past. In addition, it is true that State

laws have in some instances been inadequate. There have, no doubt, been sins of omission and commission on both sides of the fence. However, of recent years the figures as published by the United States Bureau of Mines are in themselves an answer to the accusations of Mr. Lewis; and although mining is not by any means lacking in hazards, the record of the mineral industries shows that concerted efforts have been made to promote and enforce safety.

Mr. Moses, in his reply to Mr. Lewis, pointed out the improved accident record of the coal industry. He indicated the constantly declining accident rate since 1932 and figuratively picked up a lighted grenade which Mr. Lewis had tossed and threw it back in his lap. We assume the United States Bureau of Mines' statistics are correct and Mr. Lewis must have read these figures as they have been widely circulated throughout the industry. To date Mr. Lewis has not given the lie to the United States Bureau of Mines. The truth is that all industry has its hazards and mining is no exception. Furthermore, neither Mr. Lewis nor any of his cohorts accept the slightest degree of responsibility as regards safety and health in the mining industry.

The conversion of the U.M.W.A. to the cause of humanity is too recent and too sudden for the industry to take with any degree of seriousness. The situation is well summed up by one statement of Mr. Moses, "Suffice to say that nowhere in the demands of the United Mine Workers do we find an offer by them to attempt improvement in our record of injuries; nor do we find a suggestion of shared or additional responsibility to them, but rather an attempt by them to utilize the most grave responsibility and misfortune of the industry as a stepping stone to a vast treasury of dollars with which to strengthen their organization and build a social government within our public structure."

The definite reaction to Mr. Moses' able answer is that Mr. Lewis' halo is slightly tarnished and his harp somewhat out of tune.

25 Years Progress in Coal Mining

Mechanization in Western Kentucky

By STERLING S. LANIER, JR.

President
Norton Coal Company

A History of the Development From Hand to Mechanical Methods

THE picture of the past in Western Kentucky might be visualized as a surrealist's drawing showing at the top left fragments of an 8 BU and a Duckbill in a small dilapidated mine car, from the bottom of which extends vertically downward a crooked 16-lb. rail. This appears to be precariously balanced on the rump of a mule. Behind this is seen a kaleidoscope of entry drivers, scrapers, pit car loaders, conveyors, locomotives, shaft cages and simple tipples. To the right gradually emerging out of the chaos appear three distinct streams of equipment running parallel courses each growing more coherent, as all approach a not too rosy dawn, partially obscured by a cloud of dust falling from a huge dragline bucket. Over it all broods the bristling brow of John L. Lewis.

Beginnings of Mechanization

Mechanization, it might be said, began in this field, as in others, with the first undercut made in the seam by a miner with a pick. The pick was superseded in the late 80's by air-operated punchers and practically all of the mines installed punchers in this period. Electrification began in 1889 at the Hecla mine of the Hecla Coal Company at Earlington, Ky., when a Sperry electric puncher was installed. The first coal washery was operated by St. Bernard Coal Company at Earlington, Ky., from about 1890 to 1910. The washed coal was

coked in bee-hive ovens. The first breast machine of which I can find record, was purchased by the Monarch Mining Company of Madisonville, Ky., in 1898 and quickly thereafter punchers were displaced by breast machines throughout the field. The first shortwall machines came in 1913, and breast machines soon faded from the picture.

Electric locomotives for main line haulage came in about the end of the century and the Crescent Coal Company installed an 80 hp. single-motor locomotive at their Bevier, Ky., mine in 1900. The St. Bernard Coal Company, the largest producer of that time, purchased two 12-ton locomotives in 1903. Before 1910, practically all mines of the district were equipped for electric main line haulage, and for undercutting the coal with breast machines. Shaft mines predominated, with shafts of small cross sectional area, limiting the size of the mine cars to from one to two tons capacity.



Jeffrey Entry Driver in 1919

Strip Mining Introduces Mechanical Preparation

The first major scale mechanized production in the field began in 1919 when Sunlight Collieries Company contracted with the Crow Excavating Company of Jasper, Ala., of which Mr. T. W. Crow was president, for the installation of a strip mine, near Madisonville, Ky. Two stripping units, one was a 6-yd. Bucyrus steam shovel and the other a 3½-yd. Bucyrus steam dragline with 100-ft. boom, were employed with three 1½-yd. steam shovels for loading 8-yd. side-dump cars handled by 20-ton steam locomotives. The Sunlight mine created a profound impression on the minds of underground producers, causing the initial impetus toward underground mechanization.

The Sunlight mine also served as a preview of the evolutionary pattern for mechanized preparation as very quickly it was found necessary to wash the coal. In 1922, a 100 ton per hour washery and rescreening plant preparing 3-in. minus sizes was installed. This was a duplicate of the preparation plant erected in 1921 at the Nortonville No. 1 shaft mine. The first washery for commercial grades was a 25 ton per hour experimental plant installed in 1920 at the Norton No. 2 mine at Nortonville.

To the best of my knowledge, these plants were the only washeries operating in the State of Kentucky in the period between 1920 and 1930.

The opening of the Sunlight mine was quickly followed by a number of other strip operations, including Western Collieries in 1920 at Ilsley, Ky., on No. 11 and No. 12 seams; Magic Collieries in 1922 on No. 6 seam at Ilsley, Ky. The Hawley McIsaac's Coal Company opened three large strip producers in 1922 and 1923 at Carbondale, Nebo and Centertown respectively, followed by Dawson Daylight Coal Company on No. 6 seam at Dawson Springs, Ky. Several other strippers appeared in the early 20's. I mention the advent of relatively large volume strip production of this period because of the conditioning effect it had in sharpening the interest of underground producers in possibilities of mechanization underground.

Early Loaders, Scrapers and Conveyors

The first underground loading machine that I have knowledge of, however, appeared simultaneously with strip mining. This was a Jeffrey 34-A entry driver installed in the Mogg mine of Green River Collieries in 1919. The Jeffrey Mfg. Company

advises of a record of my inspecting the operation of this machine in the Green River mine on May 15 of that year and I can remember the deep impression it made on me to see a machine overcutting, shearing, undercutting, breaking down and loading coal without use of explosives. This machine operated from April of that year until September, 1920. The coal seam was woody and tough, mine cars were of about 1½-ton capacity mechanically loaded, and much time was lost laying up track, and changing cars. Under these conditions, the machine drove approximately 15 ft. of entry 12 to 13 ft. wide, 6 ft. high, per shift of eight hours, thus producing about 45 tons per shift. Its chief value appeared at that time to be fast development of entries, in order to yield additional territory for hand loading.

In 1921 came the Goodman scraper loader, the first of which was shipped to Norton No. 1 mine at Nortonville. In May of 1922, Grapevine Coal Company followed suit. W. G. Duncan Coal Company, Luzerne, Ky., purchased one in 1923 and followed this with a Sauerman scraper. The Goodman type B scraper loader used in this field consisted of a three-drum, self-propelling track mounted hoist traveling on the entry track operating by ropes a V-shaped bottomless drag



A pioneer development—Hand loading into a face conveyor



Steel cars are replacing wood for mechanical loading

scraper. The scraper was dragged across the face of a room by means of an ingenious system of rope sheaves, which enabled the scraper to be turned as soon as one pointed side of the V had pulled loose enough coal from the previously undercut and shot face to fill the one-ton capacity enclosure of the two sides. The scraper then traveled to an incline at the neck of the room and over the top of a mine car, into which the coal dropped.

Delays in setting rib anchors or jacks carrying sheaves, and adjusting ropes, frequent tight coal in the faces, together with the small load carried by the scraper, prevented this system from being successful. The scraper, however, had large capacity in a loose pile of coal and the Nortonville machine was later used in storing slack on the ground and still later reloading into railroad cars. It did very good work at this task, handling as much as 300 tons in a shift. It is still in use as a car mover hoist, so much could be said for it as an adaptable piece of equipment. The writer still thinks that this type of scraper, of larger capacity, has interesting possibilities if used to pick up two or more falls of loose coal piled by a mobile loader, thus eliminating all car change delays to the mobile loader.

The four BU Joy loaders appeared shortly thereafter. Hart Coal Company, Mortons Gap, Ky.; W. G. Duncan Coal Company, Greenville, Ky.; Greenville Coal Company and Norton Coal Company installing two each. These machines had small capacity and were soon discarded.

In 1925 Norton adopted a slabbing system at Nortonville No. 1 Mine,

using 47-A chain conveyors with drop forged chain, for hand loading on 300 ft. faces. These conveyors were much heavier than later designs. Three Jeffrey 43-A shortwaloaders were installed to develop the faces. These machines cut the coal as a shortwall, then sumped in again after shooting, with three cutter bars, pulling the coal to a conveyor, discharging on the 47-A section conveyor.

Pairs of parallel places were driven with 20-ft. pillar between. Over a six-month period an average of 23.9 ft. of linear advance per eight-hour shift was obtained.

These places were slabbed out to 50 ft. in width. Car service at the entry was not the best. Moving conveyors were slow and expensive. Roof trouble developed and some of the conveyors were lost. After about 12 months conveyor loading was abandoned and the 43 A's moved to the Crabtree mine, where they did valuable work in fast development of a new mine in No. 9 seam.

Mechanization Makes New Start

In 1930 mechanized mining passed out completely in this field with the collapse of the market and the consequent collapse of the wage scale. It was quickly learned that a machine cannot compete with hand loading at a low wage rate. By 1930, all strip mining of the district was abandoned, and equipment disposed of. Not until 1936 was interest in mechanization revived by higher wages, though W. G. Duncan Coal Company, Greenville Coal Company and most of the Muhlenburg County producers were loading by hand on pit car loaders.

The 8 BU Joy loader came into the field extensively in 1937. Mr. Brent Hart of the Hart Coal Company made



A 1925 model of the Shortwaloader

the field sit up and rub its eyes when he adopted the Fletcher system at his No. 2 mine at Mortons Gap, Ky., with 8 BU Joys loading into rubber tired tractor trailers, dumping through transfer pits to small mine cars. Here begins one of three streams of coordinated equipment leading on to a rosier dawn. Most of the rest of us, however, clung to the idea for several years thereafter that we could scramble a mobile loader with mules and small mine cars and produce a palatable omelette.

Rubber Tires and Tractor Loaders

In June of 1939 the Crescent Coal Company, under the able management of Mr. Charles Rodman, opened its Paradise mine near Central City, Ky. This mine was the first instance of coordinated planning for complete mechanization underground. Two Joy 8 BU's were installed with five Joy shuttle cars, discharging at first directly into a 75-ton bin at the foot of the slope. This bin fed to a belt to the tippie. Later electric locomotives, with four-ton steel drop bottom cars were installed for main line haulage from transfer station. Very quickly, production climbed between 25,000 and 30,000 tons monthly from these two units. Later 14 BU's and six-ton cars were put in and production increased to 682,926 tons in 1944. This development served as a spur to the rest of the field and planning for new mines became the order of the day.

In 1940 the West Kentucky Coal Company began its extensive modernization program, boldly shutting down a number of old mines and opening well planned new ones of large capacity. The North Diamond mine in the No. 11 seam at Earlington, Ky., opened in 1940, was planned for complete mechanization from the face to the railroad car. Joy 14 BU loaders, Sullivan 7 BU shortwalls, mounted on Joy caterpillar trucks with Joy and Lee Norris five-ton shuttle cars were installed in No. 11 seam discharging to gathering belts, which in turn discharged to main haulage belt to a large capacity washery and tippie where all sizes were washed, lump over 6 in. being crushed before washing. This mine produced in 1941 506,508 tons of washed coal with five loading units. Thus one stream of completely coordinated mechanization came into being.

About the same time Brent Hart opened his No. 7 mine with 14 BU Joys and likewise installed gathering and main line belt haulage, and promptly sprang into outstanding production. This mine yielded 604,716 tons of prepared coal in the year 1941.



Goodman Power Duckbill replaces the Hand Shovel

Luzerne-Graham Mining Company at their Graham mine went to main line rail haulage with four-ton Sanford-Day drop-bottom cars, 14 BU Joys and shuttle cars. They installed a washery at their Luzerne No. 11 seam mine in 1941. Shortly after West Kentucky's washery got under way, Norton started washing No. 11 seam at its Crabtree mine, and the race was on for new markets, heralding new high grade stoker coals to the trade.

Track and Mine Car Operation

In 1943 Norton Corporation began the task of converting its Nortonville mine from a shaft to a slope in No. 11 seam with coordinated equipment throughout. Eight-ton Sanford-Day drop-bottom cars were put in with Goodman 460 track loaders, and 40-lb. prefabricated track in panel entries, the rail fabricated by West Virginia

Steel & Mfg. Company. A 250-ton bin was sunk below the seam at bottom of the slope, the coal feeding by belt to new tippie and washery.

Norton acknowledges a debt to the Snow Hill Coal Corp., Terre Haute, Ind., under the efficient management of Mr. Kiah Hert, from whom came the suggestion of prefabricated track. I believe the Nortonville East Opening Mine was the first in this country to go to a complete installation of prefabricated track. The first track loader came in July of 1944. In 12 months, beginning September, 1944, this one machine loaded 300,216 tons.

Two additional machines came in a year later. Three Goodman 324 AA track cutters are on order, two scheduled for April, 1946, delivery. Production in January, 1946, reached the figure of 64,755 tons gross weight, with the three units.

The Beech Creek Coal Company is now installing similar equipment at its new No. 11 seam mine at Beech



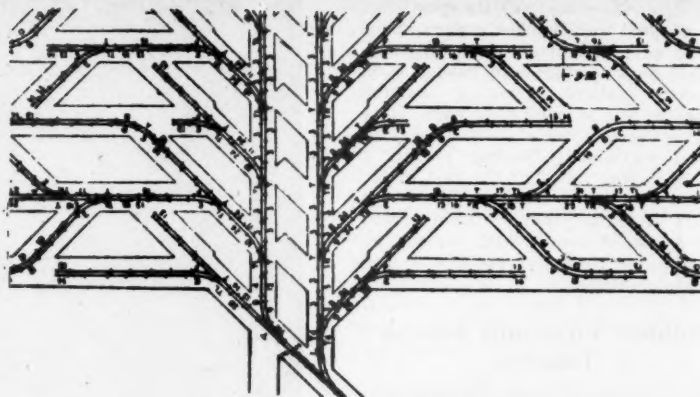
Prefabricated track for labor saving

Creek, Ky. Thus another stream of mechanized equipment via track loading in large cars traveling prefabricated track through mechanized preparation plant is under way.

Duckbills and Belt Conveyors

The third stream of coordinated mechanization began to develop in both No. 9 seam and No. 6 seam with introduction of the Goodman duckbill in West Kentucky's No. 8 mine at Sturgis, Ky., in 1936. Probably the most outstanding triumph over difficult conditions and the clearest pattern for successful results with duckbills in thin coal has been achieved by Mr. Kenneth Snarr, at the Mannington, Ky., mine of the Williams Coal Company. Excellent results, however, will be found in the No. 9 seam mines of the W. A. Wickliffe Coal Company, Greenville, Ky.; Rogers Brothers, Bevier, Ky.; the Cherry Hill mine of Louisville Gas & Electric Company, Central City, Ky.; Pacific Coal Company, Mercer, Ky., and others. The Pacific Company in 1939 installed the first 30-in. belt conveyor to take discharge from four large shaker units. There the continuous room system was started and rooms of nearly one mile in length have been successfully worked. Others quickly adopted the 30-in. gathering belt, but soon found that small mine cars limited the number of units that could be discharged onto one belt.

Williams opened a new mine in 1940 and solved this problem of belt gathering by installing six-ton drop-bottom Sanford-Day cars of 48-in. track gauge. Seam thickness there varies between 38 and 45 in. averaging 42 in. Shortwalls with 9½-ft. cutter bars were installed, but a limiting problem developed from difficulty of shoveling machine cuttings; to meet this, Williams put in two Goodman 512 shortwalls, equipped



A track layout for mechanical loading

with bug dusters. These machines have 32-in. feed and proved so successful that enough new machines were ordered to retire all of the old ones.

The type E fully automatic duckbills replaced all old ones in 1943. This machine has enough extensibility to load the full undercut made by the 9½-ft. bar. This is made easier by shooting first and loading out a snubbing shot, giving the following shots a loose end for expansion. A three-man crew can now handle the entire duckbill cycle as readily as was formerly done by four, and an enviable production per unit is being obtained.

Summary of Present Developments

Thus the three parallel streams of equipment leading on to successful mechanization in this field are seen to be:

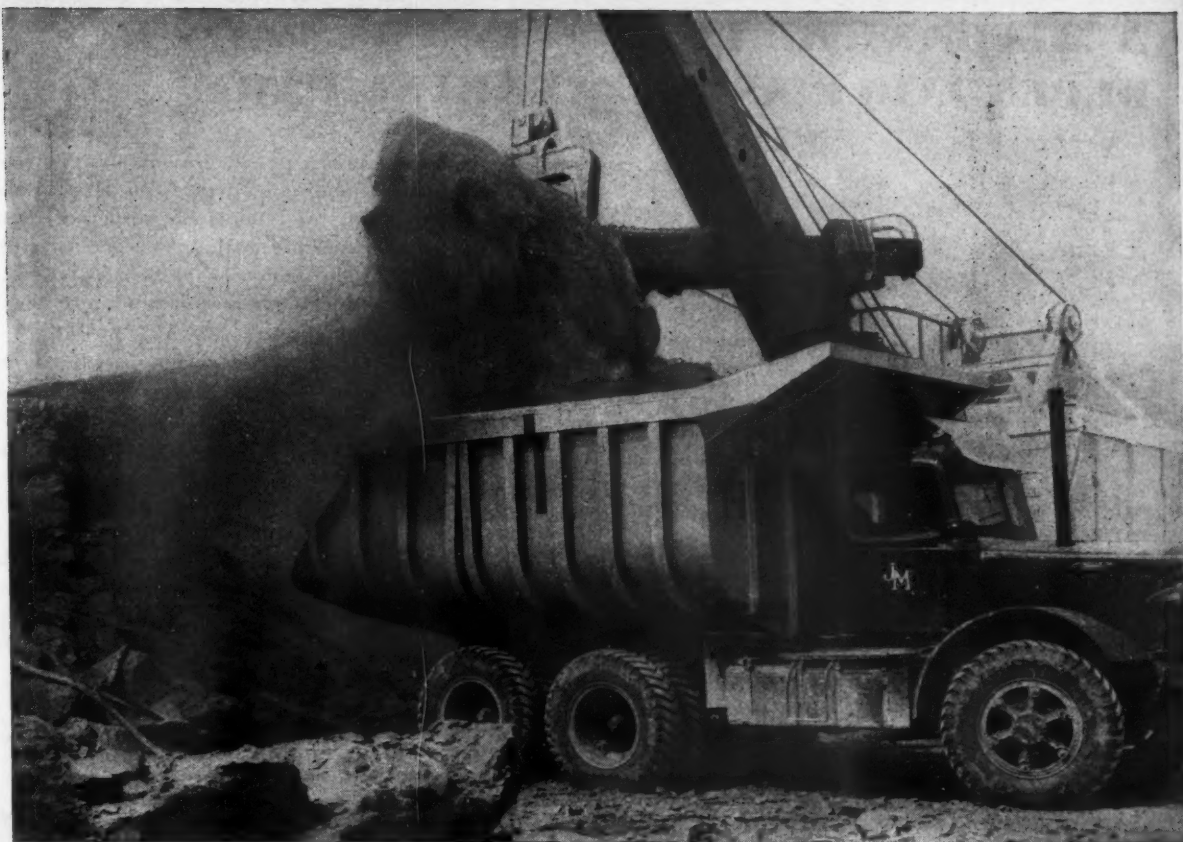
(1) Caterpillar mounted mobile loaders; rubber tired long bar cutting machines, rubber tired shuttle cars, gathering belt, main haulage

belt to fully mechanized preparation plant; (2) track mounted mobile loaders, track mounted long bar cutting machines, drop-bottom large capacity mine cars, prefabricated track, large capacity under track hopper, slope belt to fully mechanized preparation plant; (3) non-mobile duckbill type loader, long cutter bar shortwalls with bug dusters, wide gathering belts either to main haulage belt or large mine cars to bin, to slope belt, to fully mechanized preparation plant.

The West Kentucky producers, from a late start have been quick to learn the lesson that mechanization must be balanced from the face to the railroad car in order to yield efficient results. Of more than 20,000,000 tons produced in 1945, approximately 62 per cent came from completely mechanized mines underground and 22 per cent from strip mining. Strip production is growing rapidly, with large equipment and washeries of latest design. This beclouds the dawn of mechanical efficiency foreshadowing future over-production.



Mining with Joy Loader and Shuttle Car



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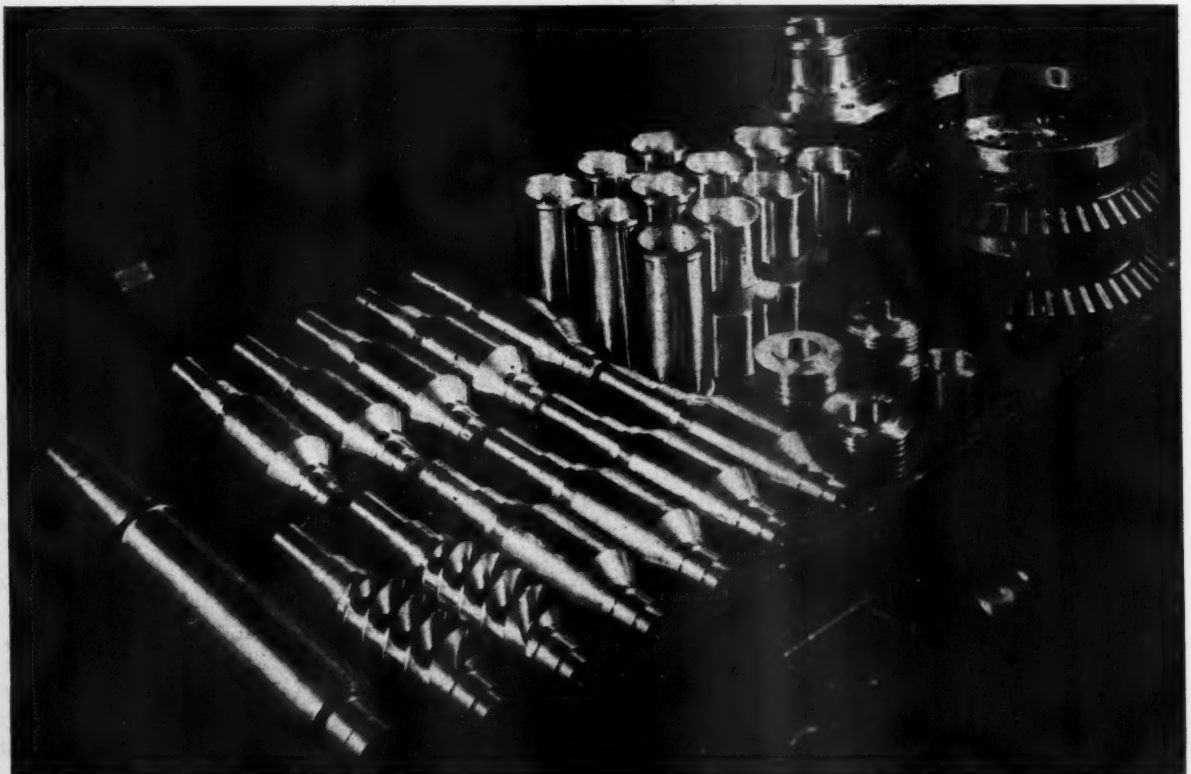
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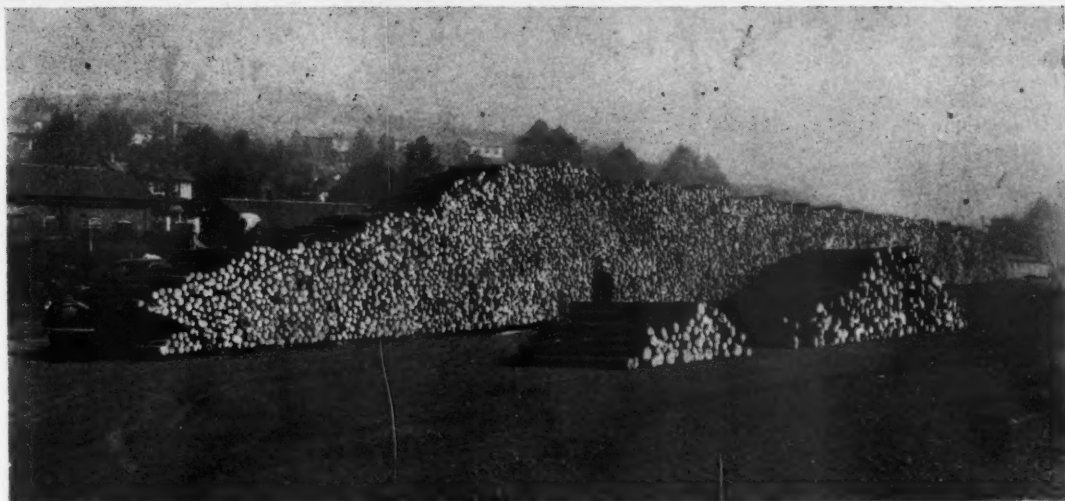
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Large sums of money are spent for mine timbers

Causes and Prevention of Mine Roof Falls

Different Types of Roof Rock Require Different Methods of Support and a Study of the Characteristics of the Strata Overlying a Coal Seam May Result in Reducing the Mine Timbering Cost

By **FRANK G. SMITH**

Chairman
Committee on Roof Action



THE Committee on Roof Action has as its general aim, the investigation of causes of roof failure. It has not been primarily concerned with methods of timbering but rather to place in the hands of mining men, a practical guide for planning roof support based on answering the question as to why their roof falls. With this end in view, a series of investigations were made to determine the possibilities of preventing roof falls by applying a water-proof coating to seal the rock against any action of air or moisture. These have not been conclusive but certain facts have been learned and the purpose of the report submitted here is to summarize and review the status of the committee's work to date.

Need for Roof Studies

In general, studies on roof action and roof support fall into that portion of coal-mining practice which has progressed least in the past several decades. While the industry has gained a much greater knowledge of most of the various elements which comprise its underground technique, the methods of timbering are still generally worked out locally on the basis of expediency and the practical knowledge of the men supervising the mine operation. Too little attention has been given to the work of determining in advance how and why any given roof rock will act; it has been an accepted belief that in most mines the top will fall, or is apt to

fall, and the usual practice has been to install sufficient steel or wood or concrete to support it.

In recent years, however, rising labor costs plus manpower shortages have made it imperative that time spent in cleaning up slate falls and in retimbering haulageways and air courses be cut to an absolute minimum. The costs of treating roof to prevent falls which would have been prohibitive in former periods when wage rates were lower, now become feasible because of the much greater proportionate increase in labor costs as compared with costs of roof treatment. Furthermore, as mechanization of the coal mines has advanced, interruptions have become progressively more expensive; concentrated workings produce large tonnages from relatively small mining areas and any delay to such an operation is immediately reflected by a reduced output and a corresponding increase in the daily cost.

All the foregoing is becoming recognized by the coal industry; the

conventional methods of roof support are, of course, effective but in many cases are expensive and at times the most conscientiously developed plans of timbering have failed because there was no definite knowledge of the overlying strata. In other instances large sums of money have been spent where simpler methods, costing less, would have served, had it but been possible to gauge the characteristics of the roof rocks in the beginning. The purpose of the Roof Committee therefore is to see to what extent cheaper methods of holding the top can be developed to meet this problem.

Causes of Roof Failure

It is generally accepted that there are several basic causes for roof falls—weathering, structural weakness of the rock, geologic stresses in the overlying strata, temperature changes, and water and gas pressures. Each of these has several variations and it is often difficult to determine in any mine which factor or combination of factors is responsible for the local roof action. One purpose of the committee is to assist in such determination and, for clarification, the following discussion of these factors is presented.

Weathering is the deterioration caused by chemical action of moisture or oxygen in the mine air with minerals in the roof rock. This is easily recognizable when the familiar slacking or softening occurs on the underside of the roof strata, but is not so apparent when oxidation penetrates vertically for some little distance into the top through slips or cleavage planes. In such cases, pieces of considerable thickness come down and the cause is often erroneously attributed to an inherent weakness of the rock.



High roof falls are costly



Heavy top needs heavy timbering

Structural weakness is probably the greatest cause of roof falls. This, in general, may be defined as the inability of the roof strata to act as a beam and support its own weight across an entry when the coal is removed. This structural weakness usually results from low tensile or compressive strength in the roof material as in the case of clayey minerals such as clod, draw slate, soft shale or soapstone.

The above applies to materials which may be said to be more or less homogeneous. Another form of structural weakness, however, results from the presence of vertical cleats, horizontal bedding planes or slips in the top rock which tend to break up the roof structure. In such instances, the roof material itself may be inherently strong, as in the case of certain shales which are relatively impervious and quite hard and flintlike in appearance, but the presence of fracture lines weakens the structure to such an extent that it will not support itself and it falls of its own weight.

A further cause of roof weakness is the presence of clay dykes or intrusions of plastic material such as fire clay that have been forced through the roof rock by the pressure of overlying strata. These intrusions break up the roof structure for some distance away from the actual clay dykes and create one of the most serious problems in mine timbering. It might be well to state that the pressure which originally caused the intrusion, occurred in a past geologic age and is now stabilized to the point that no stresses are present, nor is there any roof movement when the coal is mined.

Geologic stresses in the strata overlying the coal, can influence the roof

when the support of the coal is removed. These stresses generally result from past movements in the earth's crust or from changing pressure as erosion takes place in the surface over the seam, or from subsidence of the ground as the coal is mined from adjoining areas. They are latent within the coal measures until mining provides an outlet.

Water and gas in the overlying strata can cause considerable roof trouble which can seldom be corrected by the conventional types of roof support. Usually the only relief is through mining or a slate fall which will drain off the water and in many cases bleed off the gas. In some mines it is customary to drive an advance "caving chamber" in which the roof will break and thus remove the pressure from the adjoining places.

Temperatures underground are popularly supposed to be nearly constant from day to day, and with only a few degrees of seasonal variation throughout the year. It is a question, however, as to how far this concept is correct. As a matter of fact, in a test made recently in a coal mine, a variation of 10 degrees in the temperature of the mine air, at a station well underground, was recorded during one week. Such fluctuations in the mine air temperature could, conceivably, have some effect on the immediate roof, and the resulting expansion and contraction movements of the rock, even though microscopic, would eventually cause breaks.

Classification of Roof Rocks

In consideration of the foregoing, the committee is attempting to develop methods for predetermining and evaluating these factors. Up to the

present time the procedure in actual mining has been based on someone's past experience with top in the same locality, or with roof rocks which appeared to be similar. A scientific approach to an analysis of the characteristics of various roof strata must follow two general lines; *first*, a determination of the mineralogical and chemical properties of rocks, with particular reference to the effects of weathering, and, *second*, an analysis of their geological and strength characteristics. In other words, to predetermine their ability to serve as a beam after coal is removed.

For the first step it was felt that a standard nomenclature should be adopted for roof rocks before roof problems could be discussed intelligently in terms of the failure characteristics. At present local names are used to describe various roofs and may have different meanings in different localities; furthermore, there has been a wide divergence in the nomenclatures used by operating men and mining geologists. As an approach to this phase of the problem, at the outset, a tentative classification of roof rocks from the standpoint of deterioration was prepared by Drs. Martens, Price and Headlee.

The second step in the work of the committee was the development of a standard data sheet to be used in reporting local mine roof conditions where tests were to be made. This work was done in conjunction with observations made by the committee in connection with mine roof sealing as a means of roof support and is to be used in submitting samples of roof rocks for investigation.

Laboratory Tests

Samples of roof rocks were subjected to tests of various types to determine the effect of weathering. First, they were given a thorough mineralogical examination with a view to classification and definition. The presence of minerals which would be particularly prone to deteriorate when exposed to moisture was noted. Analyses were also made to determine the presence of any minerals which might affect roof rocks through swelling as a result of oxidation. Then the samples were subjected to extended weathering tests which were developed by Dr. Paul Price and performed at the West Virginia Geological Survey.

Committee reports have already described the details of these tests which consisted in exposing samples of roof to the action of water and heat, thereby accelerating the action which would take place had they been exposed to atmosphere over a long period of time. The effect of this treatment upon the rock was carefully observed, noted and recorded.



Mechanization reduces labor of slate handling

The causes and extent of swelling were determined by subjecting carefully prepared samples to tests by the Bureau of Mines; these consisted of careful measuring of the extent and rapidity of swelling when definitely measured changes in temperature and humidity were made.

Experimental Roof Sealing

The foregoing procedures were used by the committee in an actual test of a mine roof to determine if weathering could be prevented by waterproofing the top with a coating of paint—an asphalt emulsion. Rock samples were taken in a mine operating the Pittsburgh seam and as the tests indicated that sealing had a reasonable chance of success, the

mining company conducted an experiment underground by applying a seal coat to certain entries near an intake air shaft.

Examinations of the areas sealed were made by members of the committee before, during, and after the sealing was done. For the first full year after installation, the sealing stood relatively well in some areas and failed in others. Where failure occurred, there were noticeable disturbances in the rock strata, mainly in the form of clay veins, slips, etc. The conclusions reached by the committee were: *first*, that, as a test, the project was not satisfactory since there was no opportunity to compare treated and untreated areas in close proximity and having the same local



Experimental roof sealing to prevent weathering

conditions, and *second*, a definite geological examination was imperative before recommendations could be made for or against sealing. In other words, roof sealing in itself is not a preventive for roof falls where failure occurs from causes other than weathering or chemical action.

As a result of this first attempt, the same company agreed to set up a further test based upon recommendation of the committee. In this instance the experimental area was in two parallel entries, with alternate treated and untreated areas in 100-ft. lengths. These were so arranged that the treated sections were opposite untreated sections in the parallel entry. Again, the results were carefully observed after a period of exposure and it was found that certain areas had failed while others stood. Generally, failures occurred where the overlying strata was disturbed by faults or clay veins. However, one further condition was observed; where water came through the roof, the seal could not be maintained, it parted from the rocks and became ineffective.

Conclusions from the Test

Two conclusions were obvious; first, that a certain amount of deterioration was inevitable between the time the coal was mined and the roof sealing agent applied, no matter how short a time interval elapsed. This allowed, at best, some small pieces to be loosened. Second, that the roof paint had no structural strength and

was unable to support even the weight of small loose chips. The result was that wherever these small chips occurred, the seal was broken and it became necessary to repair it in order to prevent further progressive breakdown. If the seal coat had had sufficient strength to hold in place the deterioration which had already started, it is highly probable that no further action would have resulted.

The final conclusion of the committee was that very rarely could a mine roof material be found which would be controlled by roof painting alone. Careful examination of the areas tested indicated that weathering was supplemented as a cause of roof failure by general structural weakness in various places. It was, however, observed that the weathering characteristics could be determined in part by laboratory tests and that these tests, supplemented by mineralogical and geological examination, did serve as a definite approach to the problem of why roof fails.

Future Committee Work

The general work of the committee will be continued; that is, the work of carrying out its fundamental aim of developing the techniques necessary to the predetermination of probable roof action without regard for any special method of roof support. The following are specific phases which will be studied.

First, it is felt that much additional work can be done in the field of classification of roof rocks, particularly

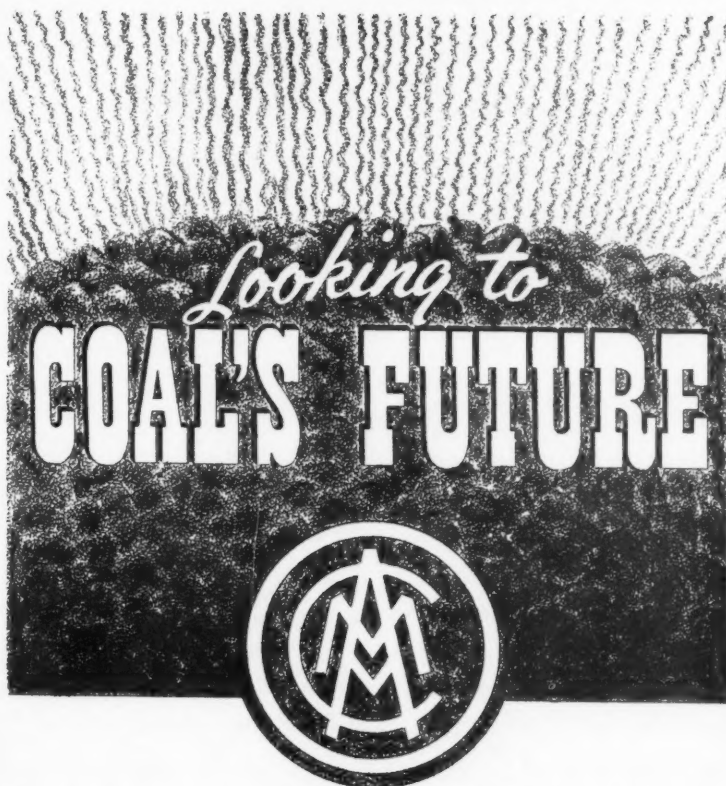
in the matter of classification from the standpoint of structural characteristics as well as the effect of weathering. Much more attention can be given to the development of standard nomenclature which will not only be more completely descriptive of the characteristics but which will serve as a common meeting point between practical operating officials and geologists. Such a classification can serve as a basis for an "on the spot" evaluation of roof characteristics by operating officials.

In addition, the work of developing standard sampling and reporting methods should be continued. More than has been done can be accomplished and samples taken by core drills should be investigated as a possible approach to the problem of planning roof support in advance of mining.

Finally, it is planned that further investigation will be made of roof support methods and materials and their application to various types of rock strata; this grows out of the fact that various causes of roof failure require differing treatment. Some work on roof support materials has been done by the committee in the past. There is now available a report of the committee setting forth in tabular form data upon wood and steel beams and columns which enable operating officials to determine the steel shape necessary to equal a wood beam or column of a given size. This might well serve as a starting point for further investigation.



All types of structural materials are used for mine roof support



AMERICAN MINING CONGRESS
1946 COAL CONVENTION
NETHERLAND PLAZA HOTEL
CINCINNATI, OHIO *April 29-30*



GEORGE L. SMITH

Vice President
Rochester & Pittsburgh Coal Co.
National Chairman, Program
Committee

THE coal industry today is better equipped to meet the future than ever before. This may seem like over-optimism but the basis for this statement is the fact that for the first time in our history the industry is willing to admit the seriousness of the situation it faces.

Until recently we have all held the fatalistic viewpoint that the market for coal was set by the general business index and that nothing could be done about it; today coal's competitors have made us realize that the market for heat and power goes to the fuel which offers the most to the consumer—either in terms of price, efficiency or convenience.

However, the story of coal mining is a story of difficulties overcome; today's problems will be no exception and with the belief that coal is fully competent to meet its competitors on any ground, the industry will gather in Cincinnati to discuss ways and means.

The Program Committee is bringing to the Convention, speakers of recognized ability and experience; we feel that no mining man can afford to miss this opportunity and urge everyone interested in the future of coal to meet with us.

George L. Smith

Coal's New Era—

Annual Convention Will Discuss Coal Problems

April 29 and 30, at Cincinnati

THE eyes of the coal industry will be focused upon the Coal Convention of the American Mining Congress at Cincinnati during the last two days of April, and from all indications this meeting will be unusually well attended. As post-war problems in the industry are basically different from those that have been met during the last four years, and since mining is essentially the same in peace as in war time, reconversion in the ordinary sense is no issue. The essential task now facing the coal industry is that of adjusting operating conditions to meet new peacetime requirements for its product.

Prior to World War I fuel was coal; in fact coal was the only means ordinarily available in the early 1900's for home heating. In almost every case the only source of electricity was from coal-burning power plants, and although some regions used natural gas and local water-power as a source of electric energy, as a rule coal reigned supreme as the primary power source from coast to coast within the borders of the United States. Today this situation has changed. Competing fuels and the increased utilization of waterpower have made serious inroads on coal's position and the industry is faced with the problem of merchandizing if it is to expand its future markets.

It is becoming evident that the industry will have to develop new demands largely through



EDWIN E. WOODMAN
*Luncheon Speaker
Monday*



A. L. HUGHES
*Luncheon Speaker
Tuesday*

improved methods of coal utilization. The problems of the immediate future are not merely those of the pre-Pearl Harbor era; the day has come when coal producers must get together on an industry-wide basis and face squarely the competition of other fuels and other power sources. The program of the meeting is designed primarily to bring together the operating, selling and manufacturing units of the coal industry to discuss aspects of the coal situation common to all concerned.

The opening session on Monday, April 29, will be devoted to the general problems of the industry, and the papers delivered will have the purpose of informing the Convention as to future prospects in coal economics with special reference to major consumers. While in a two-day session it is not possible to present all aspects of the subject, the topics chosen for review are those that the program committee deems of most importance and most interest to the industry. This session will attempt to attain a birds-eye view of coal's position in the economy of the nation; the papers as presented will indicate the necessary change in industrial and selling techniques required to fortify coal in its principal markets.

The afternoon session will be devoted to coal beneficiation, a subject which today should be of interest to all coal men.

The purpose is to indicate how the final product may be improved for selling and the importance of improved beneficiation in attaining this end is well recognized.

The Tuesday morning and afternoon sessions will embrace methods of coal mining. In general these

(Continued on page 54)



WARREN WHITNEY
*Guest Speaker
Annual Dinner*

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J. B. MORROW
Pittsburgh Coal Co.



T. G. GEROW
Truax-Traer Coal Co.

HARRY M. MOSES
President
H. C. Frick Coke Co.
Chairman, Coal Division



THE proud record of the coal mining industry during the long years of war is one that can make every man associated with it feel a glow of satisfaction at its successful conclusion.

We approach the problems of peace, the rehabilitation of our industry, worn by shortages of equipment and lack of manpower, with the same confidence that we tackled the requirements for war.

Our Conference this year will be stimulating to the mind and for the first time in many years we can direct our whole attention to methods of operating our mines with the highest possible degree of efficiency and safety.

I look forward to seeing all of you there.

Harry M. Moses

PROGRAM

MONDAY, APRIL 29

10:00 A.M.—Coal's Future

Session Chairman: George L. Smith,
Vice President, Rochester & Pitts-
burgh Coal Co.

Economic Problems of the Coal Industry

G. A. LAMB, Assistant Director,
U. S. Bureau of Mines.

Locomotive Fuel Economics

J. I. YELLOTT, Director of Research,
Locomotive Development Committee,
Bituminous Coal Research, Inc.

Economics of Domestic Heating

B. R. GEBHART, Vice President,
Chicago, Wilmington & Franklin
Coal Co.

12:30 P.M.—Luncheon

Address: Present Developments in Plastics

EDWIN E. WOODMAN, Durez Plastics
and Chemicals, Inc.

2:30 P.M.—Coal Beneficiation

Session Chairman: J. B. Morrow, President,
Pittsburgh Coal Co.

Heavy Density Processes for Coal Beneficiation

D. H. DAVIS, Product Control Manager,
Pittsburgh Coal Company.

Drying Coal Thermally and Mechanically

LANING DRESS, Preparation Engineer,
Pyramid Coal Corporation.

Cleaning Anthracite Small Sizes

W. H. LESSER, Pierce Management.

2:30 P.M.—Manufacturers Meeting

An open meeting of the Manufacturers Division, American Mining Congress, for discussion of special problems of mining manufacturers. All manufacturers attending the convention are invited to be present.

TUESDAY, APRIL 30

9:30 A.M.—Deep Mining

Session Chairman: George F. Campbell,
Vice President, Old Ben Coal Corp.

Mechanical Mining in Thin Seams

J. J. SNURE, Assistant Production
Manager, Rochester & Pittsburgh
Coal Company.

Maintenance of Underground and Surface Equipment

WILLIAM BURNETT, Electrical Engineer,
Peabody Coal Company.

Mechanical Mining in Thick Seams

GEORGE R. HIGINBOTHAM,
Production Manager, Consolidation
Coal Co.

9:30 A.M.—Strip Mining

Session Chairman: Hugh B. Lee,
Vice President, Maumee Collieries
Co.

Reclamation and Conservation of Stripped-Over Lands

L. E. SAWYER, Director, Forestry and
Reclamation, Indiana Coal Producers'
Association.

JAMES W. BRISTOW, Secretary-
Treasurer, Illinois Coal Strippers
Association.

R. T. LAING, Executive Secretary,
Minerals Producers Association,
Pennsylvania.

12:30 P.M.—Luncheon

Address: Atomic Power

A. L. HUGHES, Professor of Physics,
Washington University, St. Louis, Mo.

2:30 P.M.—Deep Mining

Session Chairman: R. E. Kirk,
Assistant Vice President, Tennessee
Coal, Iron & R.R. Co.

Modernizing the Mine Organization

R. E. SALVATI, Vice President, Island
Creek Coal Co.

Safety Practices at Union Pacific Coal Co.

F. J. PETERNELL, Safety Engineer,
The Union Pacific Coal Co.

Underground Haulage with Locomotives and Mine Cars

C. C. HAGENBUCH, Assistant to Vice
President, and
C. R. NAILLER, General Manager,
Hanna Coal Co.

Underground Haulage with Belt Conveyors

RAY COBB, Superintendent, West
Kentucky Coal Co.

2:30 P.M.—Strip Mining

Session Chairman: T. G. Gerow,
Vice President, Truax-Traer Coal
Co.

Future Use of Rubber in Strip Mining

J. G. BERRY, Field Engineer, Tire
Engineering Department, United States
Rubber Co.

Large Drag Line Excavator in Coal Stripping

R. M. DICKEY, Sales Engineer,
Bucyrus-Erie Co.

Strip Mining Two Seams in One Operation

R. PAUL MAUGER, President, Mauger
Construction Co.

7:00 P.M.—Annual Dinner

TOASTMASTER:

GEORGE B. HARRINGTON, President,
Chicago, Wilmington & Franklin Coal
Co.

Address: "The Future Starts Today"

WARREN WHITNEY, Manager,
National Cast Iron Pipe Div., John
B. Clow & Sons, Birmingham, Ala.

H. V. BROWN
General Manager
The Brown-Fayro Co.
Chairman, Manufacturers Division



THE major reconversion problem of the coal mining industry is that of maintaining its markets in competition with oil, gas and hydro-electric power. The most important factor in the cost of coal is wages, which have risen to an unprecedented extent during the war and since its termination. On the other hand, wages represent only a small part of the cost of coal's competitors, and they have the additional advantage in that one of their principal costs—interest on investment—has been substantially reduced during the last decade.

This situation calls for the maximum degree of cooperation between coal producers and the manufacturers of mining machinery, to the end that every possible advantage is secured from the complete mechanization of all operations in the production of coal—from the face to the preparation plant where the finished product must be of such quality and in such form as to fully satisfy the discriminating user.

The conventions and expositions of The American Mining Congress provide the opportunity for just the kind of operator-manufacturer cooperation that is needed. Let's have a full attendance on April 29-30 at Cincinnati.

A handwritten signature in dark ink, appearing to read 'H. V. Brown', written in a cursive style.



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ES DIVISION

G CONGRESS

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*Leschen & Sons Rope Co., A.
*Link-Belt Co.
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*United Engineers & Constructors, Inc.
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Western Cartridge Co.
Western Machinery Co.
*Westinghouse Electric Corp.
West Virginia Steel & Mfg. Co.

Speakers

At The Coal Convention

• G. A. LAMB, Assistant Director, U. S. Bureau of Mines, Washington, D. C., will analyze the **ECONOMIC PROBLEMS OF THE COAL INDUSTRY**, discussing the economic factors likely to arise in future years.



• J. I. YELLOTT, Director of Research, Locomotive Development Committee, Bituminous Coal Research, Inc., Baltimore, Md., in his paper on **LOCOMOTIVE FUEL ECONOMICS** compares the efficiency characteristics of steam, diesel and coal-burning turbine locomotives.



• W. H. LESSER, Pierce Management, Scranton, Pa., presenting a paper on **ANTHRACITE RECOVERY OF FINE SIZES**, discusses practices in the anthracite field for reducing washery losses and reclaiming waste products.



• B. F. GEBHART, Vice President, Chicago, Wilmington & Franklin Coal Co., Chicago, Ill., discusses **ECONOMICS OF DOMESTIC HEATING** and explains coal's superiority as a source of heat and its economy over other fuels for domestic use.



• J. J. SNURE, Assistant Production Manager, Rochester & Pittsburgh Coal Co., Indiana, Pa., describes **MECHANICAL MINING IN THIN SEAMS** with mobile and stationary loading machines.



• D. H. DAVIS, Product Control Manager, Pittsburgh Coal Co., Library, Pa., reviews the development of **HEAVY DENSITY PROCESSES FOR COAL BENEFICIATION** in the United States and Europe for slate and coal separation.

• WILLIAM BURNETT, Electrical Engineer, Peabody Coal Co., Chicago, Ill., in his paper on **MAINTENANCE OF UNDERGROUND & SURFACE EQUIPMENT** covers shop and underground repairs as well as lubrication and daily inspection.



• LANING DRESS, Preparation Engineer, Pyramid Coal Corp., DuQuoin, Ill., discusses the fundamentals of various methods for **DRYING COAL THERMALLY AND MECHANICALLY**, covering screens, centrifugals and heat dryers.

• GEO. R. HIGINBOTHAM, Production Manager, Consolidation Coal Co., Fairmont, W. Va., outlines the development of **MECHANICAL MINING IN THICK SEAMS** in northern West Virginia, describing mining systems and operating methods.





• **L. E. SAWYER**, Director, Forestry and Reclamation, Indiana Coal Producers' Assn., Terre Haute, Ind., gives a history of **REFORESTING STRIP PITS AND SPOIL BANKS** in Indiana beginning with the first planting in 1926 and continuing to present day methods.

• **R. PAUL MAUGER**, President, Mauger Construction Co., Columbus, Ohio, describes **STRIP MINING TWO SEAMS**, including practices and equipment for removing overburden and loading the coal.



• **JAMES W. BRISTOW**, Secretary-Treasurer, Illinois Coal Strippers Assn., Chicago, Ill., reviews the **METHODS OF RECLAIMING STRIPPED-OVER LAND** by Illinois operators and outlines the factors to be considered in planning a reclamation program.

• **RAY COBB**, Superintendent, West Kentucky Coal Co., Earlington, Ky., describes **UNDERGROUND HAULAGE WITH BELTS**, covering main line, intermediate, and panel haulage, including methods of loading and unloading as well as the maintenance organization.



• **R. T. LAING**, Executive Secretary, Minerals Producers Assn., Kittanning, Pa., discusses the **PROBLEM OF RESTORING STRIP PITS** and cites numerous examples of successful reforestation with different kinds of trees.



• **J. G. BERRY**, Field Engineer, Tire Engineering Department, U. S. Rubber Co., Detroit, Mich., forecasts **FUTURE USE OF RUBBER IN STRIP MINING**, outlining trends in operating methods and equipment for open pit mining.



• **R. E. SALVATI**, Vice President, Island Creek Coal Co., Holden, W. Va., in his paper on **MODERNIZING THE MINE ORGANIZATION**, outlines some of the major problems of management and personnel relations.

• **R. M. DICKEY**, Sales Engineer, Bucyrus-Erie Co., Chicago, Ill., describes the **LARGE DRAG LINE EXCAVATOR IN COAL STRIPPING**, showing various methods of operation and predicts larger stripping equipment for greater depths of overburden removal.



• **F. J. PETERNELL**, Safety Engineer, The Union Pacific Coal Co., Rock Springs, Wyo., describes **SAFETY PRACTICES AT MINES OF UNION PACIFIC COAL CO.**, as applied to various underground operations and safety incentives which have been successful in reducing accidents.



• **C. C. HAGENBUCH** (left), Assistant to Vice President, and **C. R. NAILLER** (right), General Manager, Hanna Coal Co., St. Clairsville, Ohio, present a joint paper on **UNDERGROUND HAULAGE WITH LOCOMOTIVES AND MINE CARS**, discussing types of equipment and construction methods of underground track haulage systems.



sessions will be broken into two portions, one involving "deep mining" and the other "strip mining." Emphasis will be placed upon mechanization and the reduction of cost rather than the need for production itself, the latter having been the dominant requirement of the war period. The underground papers will include discussion of efficient means of haulage and the latest development in conveyor, as well as car and locomotive systems. The various methods of coal mine operation, both surface and underground, will be reviewed by leaders of the industry who are well qualified to present information on coal mining practice.



T. J. THOMAS
Valier Coal Co.
Chairman, Floor Committee

In addition, a complete session of the Convention will be devoted to the reclaiming of stripped-over land. The war period saw a tremendous expansion in stripping operations in existing coal areas, and although the subject of reclamation and conservation of stripped land is by no means a new one, in view of the vastly enlarged scope of strip operations it is evident that the topic is of timely interest. Aside from the importance of this subject as a feature of public relations, it is interesting to observe that former spoil land may now be calculated as a possible economic asset.

The luncheon speaker on Monday will be Edwin E. Woodman of Durez Plastics and Chemical Company, of Chicago, Ill. Plastics are entering more and more into daily life. Throughout the war they furnished much basic material for military equipment, having been used extensively in airplanes and in much



HOWARD I. YOUNG
Pres., American
Mining Congress

of the gear which men carried in the field. Coal by-products form one of the most important sources of plastic materials. With expanding markets in consumers' goods and the needs for home equipment—once new houses are being erected during the post-war era—the increased requirement for plastics will become evident. Coal is destined to play its part as a source of the raw material for many of these new products and Mr. Woodman is well qualified to present to the meeting the developments in this market.

Professor A. L. Hughes of Washington University, St. Louis, Mo., will address the Tuesday luncheon on the industrial application of atomic energy—a subject looming large in the forefront of national and international thought. Having worked on the "Manhattan Project," Professor Hughes is considered one of the outstanding authorities in this field. Because of its future implication as a possible power source, atomic energy is a matter of vital interest to the coal industry and is destined to become more and more important in the minds of the public. The American Mining Congress is indeed fortunate in having a man so well qualified to present this subject to the Convention.

The Convention will close with the Annual Dinner, Tuesday night, when all will gather informally in the Hall of Mirrors at the Netherland Plaza. George B. Harrington, President, Chicago, Wilmington & Franklin Coal Company, well known for his ability to conduct an enjoyable after-dinner program, will preside as Toastmaster.

The guest speaker will be Warren Whitney, Manager, National Cast Iron Pipe Division, John B. Clow & Sons, Birmingham, Alabama, who will give an entertaining and instructive talk entitled "The Future Starts Today," in which he will discuss reconversion and our general post-war philosophy.



GEO. B. HARRINGTON
Toastmaster



AMERICAN MINING CONGRESS



Improved Type Core Barrel

Recovery Increased in Shattered Ground

By J. L. HAVLICK

Spokane, Wash.

IN THE January issue of MINING CONGRESS JOURNAL operations of the Grandview Mine of American Zinc, Lead and Smelting Company near Metaline Falls in northeastern Washington were discussed. At this property continuous diamond drilling has been carried out both underground and on the surface. As the formation in this region is broken, a special core barrel was designed to increase recovery.

Main Features of the Core Barrel

The inner tube of this core barrel is of ball bearing type and as a rule remains stationary while the outer barrel and diamond bit revolves. The core passes into the inner tube without the rotary abrasive action so common in the rigid tube type of double core barrel. When the core blocks or jams in the inner tube it is practically impossible for the operator to grind core or do further drilling, as the tube remains stationary and swivels on the ball bearings in the back end of the core barrel. For this reason, some of the drill men refer to it as a swivel tube core barrel.

One of the more important features of this core barrel is that the inner tube is within three-eighths of an inch of the face of the bit. This prevents the circulating water used in drilling from riding on the core more than three-eighths of an inch and when drilling in abrasive ground or badly shattered seams, this is a very important factor. The core barrel is also designed so that a small portion of water is returned to the inside of the inner barrel and passes out through the return water connection, thus assisting the passage of the core from the face of the bit to the rear of the core barrel. This feature is well shown in the accompanying diagram of the core barrel assembly. A special internal threaded type of bit is used which permits the three-eighths inch clearance previously mentioned. Also a special type of bit can be interchanged with the bit in the core barrel to permit the use of a core lifter.

Bit Setting

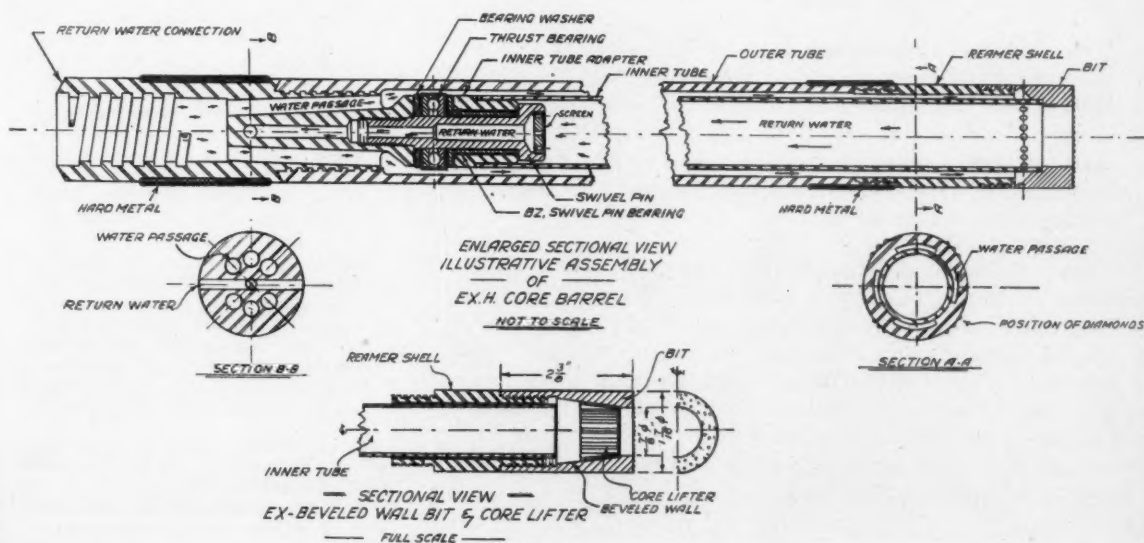
Ninety-five per cent of all the bits used at Metaline Falls are hand set. They are set in a specially equipped

shop designed for the purpose and the method used is that of drilling holes in the blanks approximately the size of the diamond and then corking them in. Special gauges, templates, and drill presses are used and this enables the diamond setter to drill quickly the required number of holes to a definite depth and gauge, which is of considerable advantage in rapid hand setting of diamonds. An old and experienced setter who used to set carbon and considered the setting of two or three bits a good day's work, with the special equipment mentioned above has been able to set as many as eight bits in an eight-hour shift and quite regularly sets five or six bits a day and thus setting costs are lowered considerably. In the Metaline Falls region it has been found that slightly better footage is secured from hand-set bits than is the case with cast-set bits, one of the advantages of hand setting being the diamond is not subjected to heat.

Size of Barrel

Most of the drilling is done with a standard E. X. size barrel and in normal broken ground the drill must be pulled whenever it blocks. The core barrel itself has extra hard metal welded in the rear end as well as at the end nearest the reamer shell.

Credit for the development of this core barrel is due to three different parties. First, American Zinc, Lead and Smelting Company's staff together with that of Metaline Mining and Leasing Company participated in designing the core barrel as well as the Diamond Drill Contracting Company of Spokane. Finally the J. L. Havlick Company, of Spokane, did considerable research on the development of this improvement.



The Economics of Higher Coal Recovery

Is a subsidy needed to stimulate methods of mining designed to improve Coal Recovery?



Howard N. Eavenson

IN A PAPER entitled "Wasting a Valuable National Resource" delivered before the annual meeting of the American Institute of Mining Engineers in Chicago of this year, Howard N. Eavenson discussed the problem posed by approaching exhaustion of readily minable coal beds and the subject of their conservation. Mr. Eavenson pointed out that conservationists are concerned with the recovery of coal that to date is frequently unmined, such as pillars, roof coal, and bottom coal. He cited figures and examples from various fields throughout the country showing recoveries in some instances of as low as 50 per cent, and indicated that although some of this loss was unavoidable, a higher average percentage could be recovered, although at an increase in cost. Finally, he proposed that a government subsidy of possibly thirty to fifty cents a ton to offset such higher cost, might stimulate the recovery of additional coal from pillars, etc., which is not now mined.

The question thus opened at the AIME meeting is naturally of great interest to mining men. It should be pointed out that Mr. Eavenson's attitude is not dogmatic; he has merely suggested an answer to a problem which he feels calls for consideration, and he agrees that this solution is by no means ideal. He would like, however, to stimulate discussion on the problem.

Dr. L. E. Young of Pittsburgh and Eugene McAuliffe of the Union Pacific Coal Company have offered discussions of Mr. Eavenson's proposal, with the suggestion they be printed in Mining Congress Journal. Both of them are reproduced herewith. Copies of Mr. Eavenson's paper may be obtained from the American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York 18, New York, and we understand the paper will be printed in full in the May issue of Mining and Metallurgy.

—Discussion—

L. E. YOUNG
Consulting Engineer
Pittsburgh, Pa.

THE paper presented by Mr. Eavenson deserves most serious consideration. Undoubtedly all American operators producing bituminous coal for the commercial market will agree that the control of production and of recovery from privately-owned coal properties should remain with private enterprise and private management.

Procedure Necessary

The payment of a "bonus for good mining in those mines having low recovery rates that will enable the maximum recovery of coal in the ground to be attained" will require, in Mr. Eavenson's judgment—

1. A study of each seam to determine "good" mining practice to produce marketable coal.

Most coal leases refer to "merchantable and mineable coal" and these terms have always been defined by the courts as being determined by prevailing economic conditions; they are related to local factors and not to a national base or index. If lessees undertake to recover and market coal which was not considered merchantable and mineable when the lease was made, the lessee should be entitled to a reduction in royalty on such coal, but this practice has not been established.

2. The determination of a standard of possible recovery (of merchantable coal) for each seam.

3. The estimation of the additional cost of mining (and preparation) to

reach the standard set for each seam and for each mine.

In an impartial determination of bonuses, undoubtedly all of these procedures would be developed and, in addition, the following matters would have to be considered:

4. Seeking (or developing) markets for sub-grade coals and finding new markets for the higher grade coal displaced by the sub-grade coal.

5. Adjusting freight rates to permit the marketing of sub-grade coals.

In many districts it would be necessary also to

6. Review the mining rights for all coal areas where complete mining is considered advisable in the interest of coal conservation, and provide for payments for damage to surface property resulting from subsidence when complete mining rights are not held by the operator.

Comments by Coal Operators

The proposal that bonuses be paid for good recovery has developed the following comments by various coal operators:

1. Progress is being made in the matter of complete-seam mining and for certain districts this practice may prove effective in improving recovery. This is true also of the mechanization of many low-seam areas which were not being developed profitably prior to mechanization. Multiple-shift operation is making possible improved recovery where pillars are being mined.

2. Selective mining is now consid-

ered to be necessary in certain seams and efficient mining practice should not be criticized or penalized because unmarketable coal is left underground. In the process of selective mining, where, for example, high-sulphur coal is left in the roof and on the floor, there is no practical method of recovering this sub-grade coal except by taking it when the pillar-coal is mined.

3. Complete recovery of pillar-coal under poor roof introduces hazards to face workers. Conservation of human life should be rated higher than the conservation of the coal.

4. Complete extraction by non-commercial companies operating where physical conditions are favorable would probably entitle such companies to a substantial subsidy, if they applied for it. In contrast, a well-managed company, operating under unfavorable conditions, would not be able to earn the bonus because the recovery would probably be low.

5. Longwall mining would probably increase recovery in thin seams but would introduce a number of difficult problems.

6. The construction of additional cleaning plants would, undoubtedly, permit more complete mining in certain seams. Mechanical preparation would have to be considered in determining whether a company was entitled to a bonus on account of good mining practice. The investment required to build new cleaning plants in order to permit complete mining could hardly be predicated on the



L. E. YOUNG

earning of a Federal bonus, unless a continuing and stabilized Federal policy on coal subsidies was assured.

7. In some coal fields where coal is now mined on the advance, full-retreat mining would undoubtedly result in improved recovery. Some mining companies would not wish to make the additional investment required to change their system of mining from advance to retreat, unless they were assured that the system of Federal subsidies would be continued for a period of years.

8. In Britain in the administration of the government-owned coal, the question was raised as to the justification of maintaining in production the high-cost marginal mines solely to recover the remaining pillars and isolated small areas of solid coal. Under the suggested bonus system the same problem would undoubtedly arise in the course of time in the United States.



Low coal can be recovered with mechanical mining

Any organized study of the proposed bonus plan might well give consideration to

(1) Some current administration problems in connection with the public ownership of coal in Great Britain.

(2) Problems in the administration of the subsidy program in agriculture in the United States.

(3) The political-social aspects of subsidies.

Problems of Administration

(1) In Britain the government-owned coal lands are administered by a coal commission which has established regional valuation boards for 10 districts. They have valued 26,026 holdings to determine the compensation due the original owners. The government is generally renewing the leases to present coal operators and now is concerned with establishing appropriate royalty rates in order to draw from the coal industry a revenue sufficient to meet the interest and sinking fund in respect of the money raised to buy out the royalty owners, and the other annual expenses. It is interesting to note the language used in the last annual report of the coal commission:

"Is any good purpose served by using as our instrument for this purpose the system of rents and royalties which existed under private ownership? The amount of time and money and human wear and tear which is now expended by the industry in the negotiation and settlement of the financial terms of leases and in accounting for them seems quite out of proportion to the importance of them either to the lessees, in terms of costs of production, or to ourselves in terms of our financial obligations. We are studying the question whether some more simple means of raising from the industry the money necessary for this purpose might not be devised to the general advantage, and shall in due course report on the subject."

With all the facilities at its command, the British Coal Commission charged with negotiating leases, determining the royalty rates, approving mining practices, and checking extraction and production, is now endeavoring to simplify procedures. This shows the tremendous amount of work involved in administering the coal lands on a national basis and is an indication of what might develop if a voluntary subsidy system were established in the United States.

Any program to create in the United States a national agency to police coal mining practice, set up proper mining costs, establish specific rates of subsidy, and determine the actual recovery of coal would re-

quire a tremendous corps of engineers, supervisors, and accountants, even though the bonuses are optional.

(2) Reference has been made to the subsidies and other aid given to the American farmer. The proposal of Mr. Eavenson is for a continuing program of differential subsidies for bituminous coal, solely in the interest of conservation. According to the most reliable data available at this time, Federal aid to agriculture amounted to:

1943	.....	\$1,037,000,000
1944	.....	765,000,000
1945 (estimated)	....	465,000,000

Of these totals, Food Production Administration required:

1943	.....	\$709,000,000
1944	.....	641,000,000
1945	.....	374,000,000

Of these latter figures the following sums were for conservation and use of agricultural land resources:

1943	.....	\$391,000,000
1944	.....	395,000,000
1945	.....	300,000,000

In general, the purpose of Federal aid has been to stimulate production and to keep down the cost of living. The amount spent on actual conservation has been relatively small when compared with the grand total.

A recent bulletin to farmers contained the following statement:

"It was felt by Congress in passing the Soil Conservation and Domestic Allotment Act that while a farmer's land is his own, he is holding title to part of our most important national resource and that public money could well



Impurities rejected mechanically by cutting out a slate parting



Complete recovery necessitates heavy timber cost

be used to preserve and improve this resource, both for the present and future generations." (U. S. Department of Agriculture, 1946 Agricultural Conservation for Pennsylvania.)

Official bulletins of the U. S. Department of Agriculture outline the practices and rates of payment authorized in the interest of conservation and increased production of farm products. Payments are now made for fertilizers, improving drainage, preventing erosion, and conserving water.

It has been stated that 88 per cent of the farmers have availed themselves of this system of subsidies which is entirely optional. The local administration has been handled by 3,000 county agriculture conservation associations.

Political-Social Aspects

(3) In a recent publication of the citizens National Committee, Inc., entitled, "Experience with Wartime Subsidies," the following statements are made:

1. "It becomes difficult to abandon or reduce most subsidies once they are instituted because industries become adjusted to the payments both in war and peace. The ability to withhold subsidy payments gives the government agency the power of life and death over a company or industry in both cases."

2. "Where a large number of producers is involved, it is virtually impossible to pay different subsidies to each based on costs. If uniform subsidies are paid to all producers in a designated area, low-cost producers receive the payments even though they do not need them."

3. "There is the danger of paying subsidies to compensate for increases in costs when those costs are not controlled effectively."

4. "The major problem is to make sure that subsidies are not used to finance wage increases and price increases. Once subsidies are paid for these purposes, widespread abuses of subsidies become possible. Politically, it is very attractive to permit wages and prices to rise while keeping vital prices stable by means of subsidies; economically, it is suicidal policy certain to fail. Thus far, subsidies have not been used to finance general wage increases, although William Green, president of the A. F. of L., has testified he would favor such a policy." (Hearings on S. 1458 and H. R. 3477, pp. 68-69.)

It may be pointed out that there is a reluctance of Congress to make

subsidies for a specific period of years, in part due to the fact that a future Congress would have to make appropriations for any future commitments.

It might be well to note what the present Government officials say as to the future of subsidies to agriculture:

President Truman stated on June 26, 1945, in signing the bill to extend R. F. C. subsidies, "As opportunity permits, subsidy programs will be reduced or discontinued as rapidly as feasible within the limits of the present law."

In his message of January 22, 1946, the President said, "None of us likes subsidies. Our farmers, in particular, have always been opposed to them."

Secretary of Agriculture Anderson said, "The food subsidies may be difficult to eliminate, but the job must be done."

When a taxpayer in the coal fields realizes how much Federal aid has been given to agriculture, he naturally asks why Federal aid has not been given in corresponding amounts to the coal mining industry. If all phases of National, State and local politics could be eliminated, many might support Mr. Eavenson in his proposal that the conservation of coal deserves national attention, and that some form of Federal assistance would be justified to protect this national resource. But many coal operators question the wisdom of a policy of giving direct or indirect control of so many important features of production and marketing to Government in time of peace.

Undoubtedly we all agree with Mr. Eavenson that the conservation of coal deserves most serious attention and if we do not support his proposal, we may be challenged to present a better one.

From time to time careful studies have been made by qualified engineers and geologists to determine the amount and causes of coal waste, beginning with the work of the Anthracite Coal Waste Commission in 1893. Comprehensive studies have been made of the wastes in bituminous coal mining, but the recommendations for increased recovery have seldom, if ever, resulted in any concerted effort to make improvements in mining practice.

Some of us feel that progress is now being made in several types of mining. What is being done in a few mines can be accomplished in others where seam and marketing conditions are comparable. The exhausting of the coal that is of best quality and is most accessible in any district frequently is followed by the opening of new mines in less accessible coal of

poorer quality. In a number of instances more complete mining is planned for these new mines.

Mr. Eavenson's proposal is probably the first made to the coal mining industry that suggests an incentive to secure "good mining" in the interest of society. It deserves serious consideration, particularly by members of the coal division. It is timely that we undertake an educational program and see what can be done through an engineering approach to improve recovery.

The coal division might make intensive studies of certain phases of the problems incident to Mr. Eavenson's proposal without going into the political-social controversial matters involved in subsidies. These studies might be grouped somewhat as follows:

1. Engineering, operating and economic problems incident to increasing the percentage of recovery in underground mining.

2. Engineering, operating and economic problems incident to improving recovery in coal preparation plants.

3. Marketing and economic problems incident to the production of sub-grade coals.



EUGENE McAULIFFE
Chairman, Board of Trustees
Union Pacific Coal Co.

MR. EAVENSON'S paper relates to an element in coal mining affairs that deserves careful consideration. That all our mineral reserves, whether oil, coal or metallic minerals, should be extracted with the least practicable loss, no one will dispute. The question of present-day importance is merely one of what the consumer can pay for the product of the well or the mine, without undue interference with the production of other necessary commodities.

Past History of Resource Exhaustion

That our national resources, mineral, lumber and even our soil, is being exhausted, is well known to all,



Coal of inferior quality is often left as roof support

yet somehow new materials and processes appear from time to time that serve even better than the old. I have in mind the almost complete exhaustion of the white pine forests of Michigan and Minnesota that were tragically wasted, the recovery confined to the best trees, the second grade and young trees too often destroyed in place. When the demand for lumber shifted to Texas, Louisiana and the Pacific Coast, and costs went up, steel, brick and concrete entered as substitutes and, today, what was wasted in the form of lumber a few years ago is being processed and used as a substitute for straight lumber.

The exhaustion of our petroleum resources has been the subject of live discussion for at least two generations, and two schools of thought enter into this situation. On January 1, 1922, the estimated oil reserves of the United States were set at 9,150,000,000 barrels.¹ As of January 1, 1943, 21 years later, our crude reserves "in known and proved fields and recoverable by present production methods" were set at 20,082,793,000 barrels.²

Our reserves of iron ore are perhaps being depleted even more rapidly than those of coal, petroleum and lumber, and the time is fast approach-

ing when lower grade ores capable of beneficiation will bulk more heavily in the iron ore industry. Copper is also becoming scarce, although heavy importations and reduction in demand, through substitutions, have lightened our very heavy domestic demand.

I mention the growing scarcity of these other basic materials where the days of exhaustion is much nearer than that of coal, with the thought that all minerals necessary to our national welfare should be included in any plan for conservation; coal having, in the past, been compelled to accept more regulation than any other wasting resource.

Two Controversial Points

There are two certain points in the author's paper to which I cannot subscribe: the first, that where "mechanical mining has been extensively practiced, the tendency has all been toward lesser recovery in mining." That has not been our experience in the West, where mining operations are conducted under difficult conditions; pitching seams with poor roof conditions and faulted ground. The Union Pacific Coal Company, working multiple seams that pitch heavily, has increased extraction from 55 to 60 per cent under hand mining, to from 70 to 80 per cent under mechanical loading methods. Candor compels the admission that cheaper coal can be ob-

tained by the use of certain types of loading machines over others, more particularly where heavy timbering is required.

The second exception I desire to make is to the author's suggestion "that the national government pay a bonus for good mining in those mines having low recovery rates." Mr. Eavenson, like most of us, deplors governmental interference in business, expressing, however, the opinion that suffering as the industry is from too much regulation, "a little more toward insuring a greater recovery of the most valuable part of our coal deposits would not mean total ruin." I confess that I am opposed to dragging the taxpayer further into the morass of subsidies such as those from which we have suffered in the past few years, where we paid millions to agriculture and to stock raisers to reduce production, while at the present moment, with a world food famine reported as just around the corner, we are looking to subsidies to bring production up.

Mr. Eavenson, always forward looking, has put his finger on a situation that deserves correction, but I would prefer to attack the abuse in some manner other than through the payment of a bonus for doing something that is the duty of the operator to do. The activities of the government in the coal mining industry now exceed actual necessity, and how and where the subsidy line could, in practice, be

¹Oil reserves in the United States Trans. (1923) 43-953.

²Minerals Year Book, 1942, page 1031.



Additional track work for pillar extraction

drawn, is a trifle beyond my comprehension. In many properties each individual acre presents a separate extraction problem and variations in working time, governed by market conditions, present problems that affect extraction and which cannot be evaluated, either before or after the work is done.

Increased Extraction an Engineering Problem

In conclusion, it is my opinion that the matter of increased extraction of minerals, and the conservation of our natural resources, is an engineering problem and responsibility, and the subject should be attacked through the channels of education, in our engineering schools, by elucidating improved methods of mining, with due stress on the importance of conservation at both the producing and consuming ends. The subject is one that well deserves consideration by the Coal Section of the A. I. M. E., and by the American Mining Congress and the various coal mining institutes. In substance, let us solve this problem within the industry and thus avoid precipitating a further step toward national socialization. I respectfully urge the reading of the paper presented by our late gifted member, Dr. James Douglas, delivered at the New Haven meeting of the A. I. M. E. in February, 1909, to be found in Vol. 40, Page 419 of the Transactions, from which I take the liberty of quoting briefly:

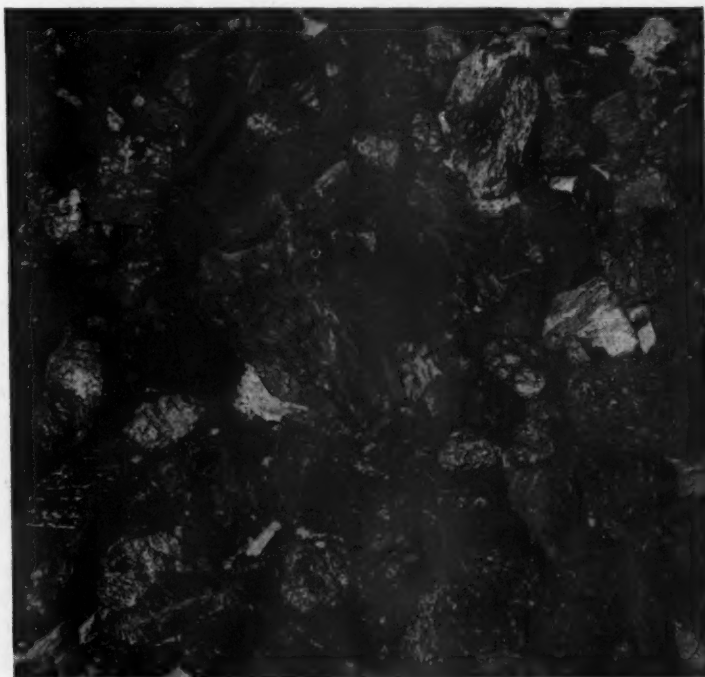
Opinion of the Late Dr. James Douglas

"While it would be presumptuous to pretend that, as a people, we are economical, and to deny that, under modern corporate control of large national resources, the temptation, under

necessity of making large profits, is not betimes stronger than the appeals which conscience makes to subordinate personal gain to the national welfare, I am sure that neither our largest mining and metallurgical companies nor ourselves, as their working agents, are recklessly indifferent to the preservation of those very materials upon which the wealth of the corporations and our own salaries depend. No large corporation would today use an old boiler and slide-valve engine with a consumption of 6 lbs. of fuel per horsepower-hour

in preference to a triple-expansion, cut-off engine which will do the same work with 1.5 lbs. per horsepower-hour, and so on through the whole gamut of operations which these large corporations conduct and which we, as their managers, advise them to adopt, because we believe them to be the best and most economical methods.

"While public policy may not be the prime motive for saving, every thinking man in a large institution, from the manager downward, takes a pride in knowing that he is saving, and feels a sense of shame when he is conscious of wasting. And in economic life—I do not speak of social and domestic life—the rules against waste are becoming more and more rigid and are better enforced. The public outcry, therefore, against the large corporations for wasting the natural resources of the nation is unjust insofar as it fails to recognize what they have done and are doing in the direction of conservation, and inasmuch as it gives the working-staff of these great corporations so little credit for the marvelous progress the world has made through their instrumentality. They have saved where formerly, through ignorance and inexperience, their predecessors were wasting. With more profound knowledge and better instruments for observation and investigation, they are patiently unraveling nature's secrets and learning how to turn her forces to human uses."



Mechanical preparation will recover coal now wasted in refuse dumps

New Metal Mining Methods



Many Changes are Indicated in the Post-war Application of New Methods in Metal Mines

★
By PHILIP B. BUCKY

Professor of Mining
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★

THIS discussion will attempt to review recent mining method developments that have had, and will continue to have, considerable effect on the mining of the future.

These may be listed as follows:

- (1) The growing importance of underground mining in the mineral picture.
- (2) The necessity for decreasing the amount of physical work required of labor.
- (3) Developments in ore breaking or fragmentation.
- (4) The contributions of science and laboratories to mining practices.
- (5) Developments in the handling of large fragments.
- (6) The new attitude toward technically-trained men.

Presented to the 49th annual meeting of the Colorado Mining Association, Denver, Colo., January 25, 1946.

Importance of Underground Mining

The growing importance of underground mining in the mineral picture may be appreciated from the fact that surface deposits amenable to open-cut mining have been depleted at an alarming rate during the last four years. In the iron country of Minnesota and Michigan the conditions are critical. More and more of our other minerals must, in the future, come from underground workings.

The best underground mining properties in the United States get about 32 tons per man-shift, while in the iron country, where the amount of stripping is small and the work is open cut, they average 60 tons.

Lest the average person think that the production rate of 32+ tons per man-day is obtained only in large, 14- to 20,000-ton-a-day properties, it is well for him to know that the best production rate is obtained in an underground limestone mine at Crestmore, Calif., which produces less than 1,000 tons a day. This mine has had no lost time or fatal accidents between 1941 and December, 1945. The important development of interest here is the proving, that efficiency and safety of the highest degree is obtainable in small properties. It is within the bounds of reason to expect that within the next decade underground production will reach a rate of 50 to 60 tons per man-day, and may exceed the present rate of production in open pits.

Decreasing Manual Labor

Whether we like it or not, we must realize that the war has made the competition for labor very keen. Men, in the near future, no longer will take a job working at back-breaking shoveling, carrying heavy machines, or working in hot, dusty, cold, or dangerous places. They will move to factory jobs where temperature and humidity are controlled and the physical efforts required are a minimum.

Flin Flon, in Canada, has recognized these facts and installed hoists between all stopes, cars to carry all materials, and has eased the miners' work to such an extent that this mine during the war period had no difficulty in getting all the labor it needed. Miners in the armed forces when asked to work in the mines, generally replied, "Yes, if you send me to Flin Flon."

I wonder how many in management realize that in some places the average man has done a day's work before he gets to his working place? He usually has to carry a heavy machine and do considerable climbing before he gets there. Most of us can remember the days when we did it. We also remember that we didn't like it. We must now realize that the time is very close at hand when men won't do it. In Canada, power shovels were introduced because of the men's refusal to muck by hand.

The question as to whether it paid Flin Flon to go to the expense of installing hoists and making things easier and more pleasant for the miners is answered by the statement that costs per ton mined have decreased, and the tonnage per man-

day has increased. Flin Flon is one of the most efficient long-hole mines in Canada.

It might be well to point out that a man can only do one hp.-hour of physical work a day, and that at two cents a kw.-hour his actual output of physical work can be performed by a machine for 1.5 cents. It may therefore be reasoned that the most recent mining method developments of considerable importance to the industries' future are those which

(A) Plan a mine and procedure which minimize the physical work done per man-day.

(B) Replace men by machines using power to perform as much physical work as possible.

(C) Realize that men are most efficiently used in a property when they use their brains to plan operations, or to control the behavior of machines.

Developments in Ore Breaking

At present we have three general methods of breaking ore:

1. The rock drill and dynamite.
2. Conventional block caving and secondary drilling and blasting.
3. Crestmore block caving and secondary drilling or blasting.

Rock Drilling—The percussive type of rock drill now finds itself in serious competition with the diamond drill. Ever since Noranda, in trying to get a rich piece of ore that they could not get by ordinary methods, used a diamond drill—and found much to their surprise that the method was quite cheap—the use of this device has increased by leaps and bounds. At present at least ten fair-sized

properties are using long-hole diamond drilling methods. The best showing is 19 tons per man-day as compared to 32 tons per man-day for block caving. These figures, however, are for ores that will not block cave and in properties which produced previously at a much lower rate in tons per man-day.

The present moot question in long-hole work is whether diamond drilling shall be done from vertical raises in a horizontal direction, or from drifts in a vertical direction.

At present, holes exceeding 100 ft. in length are used, and drilling costs per foot vary between 30 and 70 cents, depending upon the material being drilled and the price of labor.

The introduction of the diamond drill and long-hole drilling methods heralds the introduction of a *complete planning system and works program for the mine*. In these mines the exact location of the drill, length and direction of holes, and loading and firing are all planned and supervised by the engineering department. The peculiar know-how which so many miners claim they have is dispensed with and the results are as follows:

1. Better work from the miner.
2. More efficient powder consumption.
3. Better rock breaking.

The other important feature of most long-hole drilling operations is that men always work in small openings and are therefore safer.

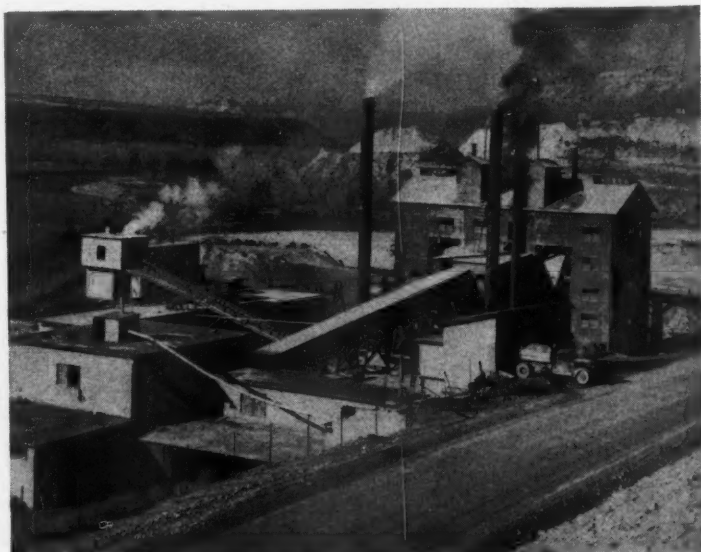
At the present time one may confidently predict much better showings in long-hole drilling, and one should not be surprised if in a comparatively short time they equal block caving performances.

Breaking Rock with Conventional Block Caving Methods—This method consists essentially in undercutting a portion of the ore body and allowing the barodynamic or earth's forces to act on the part undercut mainly by side pressure to cause the block to break to fragments of a size which can be handled. Physical tests may now be made of the ore and surrounding rock, and calculations made from a study of the geology surrounding an ore body, to determine:

- (1) Whether the ore body will block cave.
- (2) Whether the ore body will not block cave.
- (3) Whether it is a question of serious doubt as to whether it will or it won't.

It now becomes evident that in deciding whether an ore body is an economic one it is just as important to know the physical characteristics of the ore body and the surrounding rock as it is to know its ore values.

Crestmore Block Caving — This method of caving developed at the Crestmore mine was developed to cave



Plant of U. S. Vanadium Co., at Rifle, Colo.

a strong limestone ore body that would not cave by conventional means. An undercut 200 ft. x 200 ft. did not induce caving. The method used is described as follows:

Shrinkage stopes are driven completely around a block, thus freeing it from the action of any effect of the surrounding earth forces. An undercut then proceeds across the block, inducing cantilever action and a series of cracks and rock spalling. Only enough material is drawn off so as to control fragmentation, and this is kept up until the block is completely fragmented.

Laboratory Contributions to Mine Practice

It appears obvious from the preceding that a better understanding of the earth's forces and of methods of inducing stresses in portions of ore bodies will result in more efficient mining. The tools for doing this are at hand. They are barodynamic centrifuges, photo-elastic apparatus, and the mathematical and physical sciences. This means taking many of the mining problems to the laboratories and the encouragement of research thereon.

The first outstanding practical results coming from laboratory experiment were those due to Lehman's work on drawing at Inspiration. This material was published in the A. I. M. E. Transaction. Since then, or probably at the same time, considerable work along these same lines was done by Thomas at Ray, but his results were not published. They are, however, the bases for the present practice at Ray, and it is hoped they will be published.

Work at the mining laboratories at Columbia University resulted in contributions to the theory of block caving and stress distribution, in ore bodies, pillars, roofs, and to drawing practice. The material was published by the A. I. M. E. and the *Engineering and Mining Journal*. This year the A. I. M. E. meeting will have some interesting mining laboratory experiments presented by our friends at Climax.

Broken Ore Problems

Handling Ore After it is Fragmented—Long-hole drilling and block caving methods have in common the problem of handling broken ore.

The undercut for long-hole drilling work is now being made with diamond drills, and the block cavers might do well to consider the use of diamond drills for these purposes.

For both of these methods the tendency is to combine the undercut with the fingers, i.e., to make the fingers of as short a length and as great a cross section as possible. For particles of large size such as those obtained at Climax, Crestmore, King,

and Johnson, this item is of considerable importance, for it (a) decreases finger blocking, and (b) increases the output per finger.

Handling Particles of Large Size—

We now come to a most important development in underground mining, i.e., the ability to handle particles or fragments of large size, i.e., those with a minimum dimension of 2 to 6 ft. Climax is probably leading the way in this respect, with its large slushers and fingers of large cross section.

In many of the mines, grizzlies are now replaced by box holes, a box hole being an opening with no bars and only one opening. When one observes that clogged grizzlies really only have the space between two bars, i.e., one opening for the passage of materials, one wonders why grizzlies are being made with more than one opening, especially if considerable coarse is present.

The mining profession still has considerable to learn about the flow of loose material in long chutes. A number such as the Reynolds number for the flow of water should be developed for the flow of loose material, but this must come from scientific studies and laboratory tests.

New Attitude Toward Technically-Trained Men

It is pleasant to report that some of the mines are beginning to pay attention to their greatest asset—the *young men*—especially those with a scientific background and with engineering degrees.

One mine has each foreman and

shift boss make a list of problems they wish worked on by technical men. The mine hires all the college-trained men it can get each summer and, after a short work period in the mine, designed to make the young men like and get acquainted with mining, the boys are allowed to choose the problems they wish to work on. The general manager and superintendent tell me it pays off handsomely and that they take on all mining students that apply for summer work, and, that they want more.

Summary

In conclusion it may be stated that mining method developments have been forced on us by:

- (1) The depletion of high-grade, easily-mined ore bodies; and
- (2) The insistence of labor that they get more pay and work less.

Recent mining method developments have come from:

- (a) The ingenuity, ability, and vision of the men in the field.
- (b) The manufacturers and inventors of mechanical equipment.
- (c) The work of men of science and engineering, in the laboratories.

The essential ingredient in the three producers of mining progress is men, young men especially, of vision, training, and ability. They are the most important asset any industry can have. If the mining industry therefore seeks and attracts capable young men and exerts its efforts to hold them, the developments in mining in the near future will seem enormous in comparison with those of the past.



Drilling the cut holes on an Anaconda Copper property at Butte



Overload Protection for Mine Locomotives

★
By D. E. RENSHAW

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Increased Safety and Economy of Operation Can Be Attained with
Electric Locomotives By Use of Standard Protective Devices

OF THE many thousands of locomotives used in mines of the United States, a large proportion are without protection from excessive overloads and short circuits. This is not due to the fact that these locomotives were not originally equipped to provide this protection, but because operators have seen fit to nullify or remove the protective devices; or to set them for higher current values; or to allow them to get out of adjustment and proper working order. It is the purpose of this article to discuss what overload protection is, and why it should be used; to explain the standard practice followed in applying these protective devices; and to

show that this practice is logical and correct.

What Overload Protection Will Do

Overload protection is used on mine locomotives for four important reasons:

1. To provide short circuit protection. That some means should be provided to detect a failure in motors, resistors, wiring, etc., and to open the circuit quickly when such a failure occurs is obvious. Without this protection a failure can mean unnecessarily severe damage to equipment, or a mine fire.

2. To prevent the imposition of loads on the motors which will result in bad commutation. If motors are excessively overloaded, there will be spitting and sparking and possibly flash-overs at the commutator, all tending to cause rapid wear and deterioration of brushes and commutator.

3. To provide, in some measure, a limit on the stresses in gears, shafts, bearings and mechanical parts due to motor torque.

4. To minimize wheel slippage. On any mine locomotive, except possibly some battery powered ones, the motors can develop enough torque to slip the wheels, even with well sanded rails. If the protective device is set to trip before wheel slippage begins, loads must be kept within the proper capacity of the locomotive if it is to handle them.

What Overload Protective Devices Will Not Do

The overload protective devices most commonly used on mine locomotives will not prevent the motors operating above prescribed temperature limits.

A magnetic, instantaneous action overload relay (or circuit breaker) will permit a motor to operate continuously at any current below the tripping current. To illustrate what this means, assume that a locomotive starts a trip on level track and that starting requires an average current of 30 per cent over the full load rating of the motors. Assume further that, after starting on level track, the trip encounters a continuous 1 per cent grade. This grade will also require a current of about 30 per cent over full load rating. If a magnetic type instantaneous action overload relay is set high enough to permit the locomotive to start the trip, it will permit the locomotive to continue to haul the trip up the 1 per cent grade for an indefinitely long period of time at 30 per cent overload, resulting in overheating of the motors.

A time delay type of magnetic relay with proper time delay characteristics, would provide closer over-temperature protection than an instantaneous action overload relay. For example; a relay which could be adjusted to carry 100 per cent of full load continuously without tripping, but to trip at 125 per cent in two minutes, or at 150 per cent in one minute or at 200 per cent in a few seconds, would permit a locomotive to start a heavy trip and to haul it over short grades, but would not permit the locomotive to start or to haul an over-size trip. However, simple, rugged time delay relays are usually adjustable only up to 15 or 20 seconds, and relays which are adjustable for longer periods are usually neither simple nor sufficiently rugged to be suitable for mine locomotive service.

A fuse will provide a time delay, but, if the size used provides any beneficial load limit, it will gradually deteriorate and in time will burn out at normal operating current.

A thermal type overload relay has a desirable time delay characteristic, but, if the relay is mounted external to the motor, it will usually heat and cool more rapidly than the motor. Therefore, the relay will not accurately reflect motor temperature. If the relay is of the Thermoguard type, which does accurately reflect motor temperature, it will take the motor off the line before it attains an excessive temperature. However, when this occurs, it is necessary to wait 30 minutes or more for the motor to cool sufficiently to reset the relay. This characteristic makes a Thermoguard relay unacceptable for locomotive application, because a de-

lay of this duration cannot be tolerated.

The usual totally enclosed, non-ventilated motor has a continuous current rating of about 50 per cent of nominal or one hour rating. If the motor is ventilated, it may have a continuous rating up to 85 per cent of the one hour rating. In any case, the average load must be less than the nominal full load rating if excessive motor temperature is to be avoided.

Over-temperature protection of a motor requires a relay set to trip at a current approximately equal to the continuous rating of the motor. Since the currents required to accelerate and haul heavy loads in a mine are in excess of the one hour rating, the relays must be set high enough to permit the motors to accelerate and haul loads and therefore cannot provide over-temperature protection.

Standard Overload Relay Setting

It is standard practice to set overload relays to trip at 150 per cent of rated full load current of the motor. For example; on a single motor locomotive having a motor rated at 100 amperes for one hour, the overload trip would be set at 150 amperes. On a two motor locomotive, having the motors permanently connected in series, each motor rated at 100 amperes, the relay would be set at 150 amperes. On a two motor locomotive, having a series and parallel controller, or a series-parallel controller, or a straight parallel controller, and having two motors each rated at 100 amperes, the relay would be set at 300 amperes.

This value of 150 per cent of the motor rating has been selected because:

1. In general, mine locomotive motors have good commutation up to 150 per cent of full load. This does not necessarily mean sparkless commutation, but it does mean that the amount of sparking and burning will not unduly shorten the life of commutator and brushes. On any motor, the commutation grows progressively worse at higher loads, therefore, it would not be good practice to permit unlimited operation at such loads, because of the more rapid wear and more frequent failures which would result.

2. There is less probability of overheating the motors if the relay is set at 150 per cent of full load than if the relay is set at higher loads. As an example of this, a locomotive motor working at 150 per cent of rated load will be up to normal temperature rise in about 25 minutes from a cold start. At 175 per cent of full load, it will be up to temperature in about 18 minutes and at 200 per cent of normal load, it will be up to temperature in about

14 minutes. These are average figures. The smaller motors tend to heat up more rapidly on overload. The larger motors, having greater thermal capacity, heat up more slowly. See Figure 1.

3. In general, locomotive motors at 150 per cent of full load will produce tractive efforts in excess of 40 per cent of the actual weight of the locomotive. While there are instances

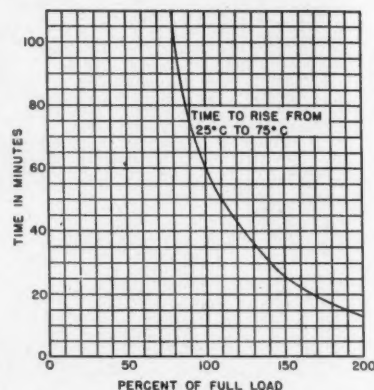


Fig. 1. Time to rise curve for typical mine locomotive motor

of locomotives hauling loads requiring tractive effort greater than 40 per cent of the locomotive weight, these instances are exceptional. In general, locomotive wheels will slip at tractive efforts less than 40 per cent of actual locomotive weight. Certainly, there can be little benefit gained by setting overload relays at currents in excess of the currents required to cause wheel slippage.

Standard Fuse Application

It is standard practice to apply a fuse having a rating equal to the locomotive current at the nominal full load rating of the motor or motors. This fuse will permit the motors to operate at 125 per cent of full load for several minutes; at 150 per cent of full load for approximately 60 seconds; and at 200 per cent of full load for about 30 seconds. A peak load of 500 per cent for a second or more may not burn the fuse, but may flash the motor.

In brief, a fuse does not impose a load limit. It merely provides protection in case of short circuit.

Locomotive Guarantees

The ratings and settings of protective devices used on locomotives must, of course, be such as to permit the locomotive to produce the draw-bar-pull for which it is guaranteed. The standard guarantees on mine locomotives are as follows:

The rated draw-bar-pull of a locomotive with chilled cast iron wheels



Modern locomotives provide for operator safety in low haulageways

shall be 20 per cent of the rated weight of the locomotive.

The rated draw-bar-pull of a locomotive with steel tread wheels shall be 25 per cent of the rated weight of the locomotive.

The starting draw-bar-pull of a locomotive with chilled cast iron wheels shall be 25 per cent of the rated weight of the locomotive.

The starting draw-bar-pull of a locomotive with steel tread wheels shall be 30 per cent of the rated locomotive weight.

The tractive effort required to produce a specified draw-bar-pull shall be equal to that draw-bar-pull plus 1 per cent of the rated weight of the locomotive.

All of these guarantees are based on operation on straight level track.

As previously stated, fuses and overload relays are applied to permit locomotives to produce tractive effort equal to 40 per cent of the locomotive weight, while the maximum guaranteed tractive effort is equal to 31 per cent of the locomotive weight.

It will be seen, therefore, that the overload relays and fuses are normally applied to permit the locomotive to produce a tractive effort greatly in excess of the tractive effort guaranteed by the manufacturer.

Why Operators Want to Set Relays Higher

There are three principal reasons why operators want to set the overload relays higher:

1. Motormen like to use the controller as an "off" and "on" switch, not as a step-by-step controller. A recent report by a service engineer states: "The usual operating procedure at this mine is for the motorman to open up the controller in one quick movement, to spin the wheels, then to feed sand until the trip starts." Naturally, if the controller is not notched up, step-by-step, but is thrown immediately from "off" to full "on," current peaks will be high and overload relays must be set high or blocked out. On properties where

no tampering with the overload devices is permitted, operators are forced to notch their controllers up properly. On these properties, it never has been found that production has been curtailed because of proper methods of operation.

2. Heavier loads can be started if locomotive brakes are used to prevent or to arrest wheel slippage. No locomotive manufacturer can afford to approve the use of brakes for this purpose. Even with the most skillful use of brakes, motors will be overloaded, and with careless use of brakes there is no practical limit to the overload which may be imposed on the motors.

3. Mine locomotives generally overrun in weight, because of the addition of a cable reel or air brakes or other equipment. These over-weight locomotives can, of course, produce greater tractive effort without wheel slippage than can a locomotive which does not exceed its rated weight. The only load limit which the operator wants to recognize is wheel slippage and this limit may be partially cancelled by the use of locomotive brakes. While this is recognized as a common attitude on the part of operators, it cannot be approved by the manufacturers and is usually not approved by mine management.

Conclusions

The standard practice of setting overload relays to trip at 150 per cent of full load on the motors is correct. This setting permits the locomotive to do more than it is guaranteed to do, and, in general, as much as it could do with higher trip setting. A lower setting would tend to eliminate failures and to reduce maintenance expense, but might also reduce the haulage capacity of the locomotive.

If the user wishes to increase overload trip setting or to do away with all overload protective devices and to take full responsibility for the results, the manufacturer has no grounds for objection.

New Edition

CONSTRUCTION AND MAINTENANCE OF MAIN HAULAGE ROADS IN COAL MINES

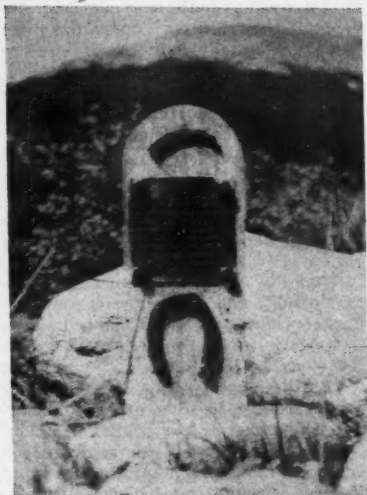
Information Which Should be in the Hands of Every Engineer and Mine Official, from General Manager to Track Foreman

A 90-page booklet, pocket size, 5½ in. x 7¾ in., covering all phases of mine track construction, from road bed to rail, for main line and secondary haulages . . . Frogs, Switches and Turnouts approved by American Standards Association . . . recommendations for installation and maintenance, based on best practices developed by operators and equipment manufacturers. Price: 75c per copy, PLACE YOUR ORDER NOW!

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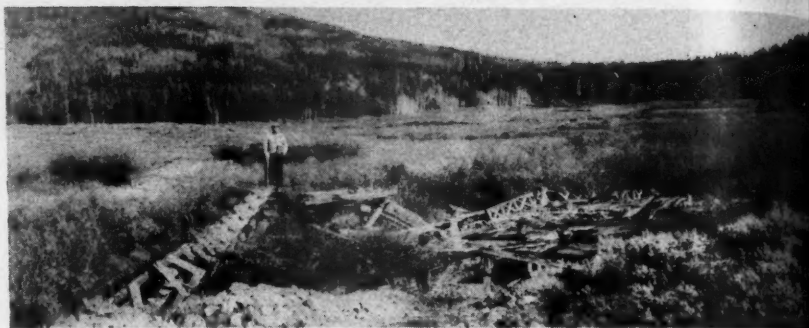


Placer monument on Tarryall Creek, Park County. The sign reads:

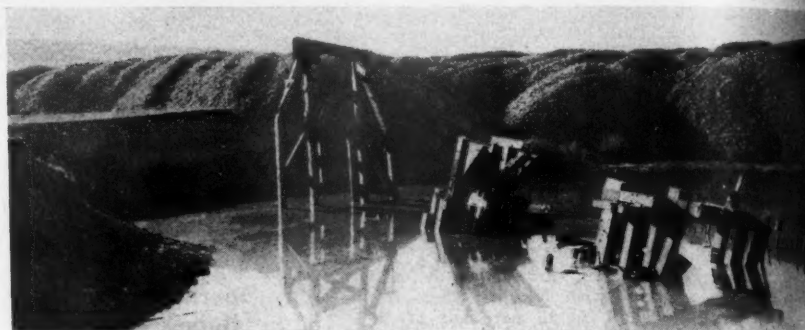
"HAMILTON POSTOFFICE"

"Established July 26th, 1860. Daniel Whitter, Postmaster. Population near 5000 in 1860 with many stores and saloons. Richest gold mines on Tarryall Creek about 1 mile above. When Como was founded in 1879, Hamilton expired."

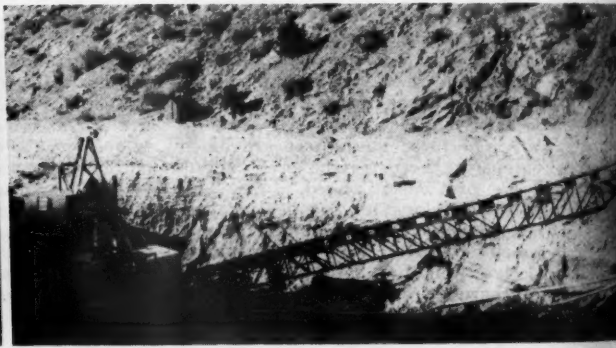
In 1942 the Cooley Gravel Company placer dredge was operating near this monument when it was shut down by Order L-208.



Remnants of an old bucket dredge near Hahns Peak, Routt County.



Remains of an old dredge near Fairplay, Park County.

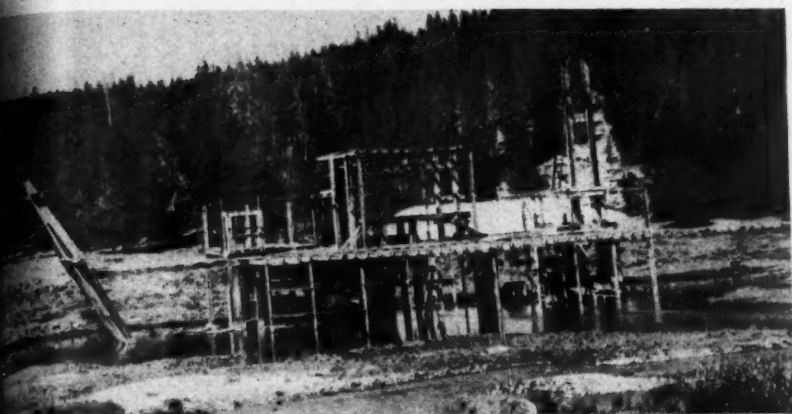


Humphreys Gold Corporation's dry land dredge on Clear Creek, Jefferson and Gilpin Counties, Colorado. This dredge operated from 1933 to 1936. It used two $2\frac{1}{2}$ cu. yd. draglines on the bank and a $1\frac{1}{4}$ cu. yd. shovel in the pit. Screening and sluicing plants were separate, self-propelled units. Maximum capacity was 4,500 cu. yd. per day.

Manion Placer Operations on Clear Creek, near Blackhawk, Gilpin County. The washing plant, fed by power shovel, operated in the pit from where fines were pumped to portable sluice boxes on the dredge tailing pile.

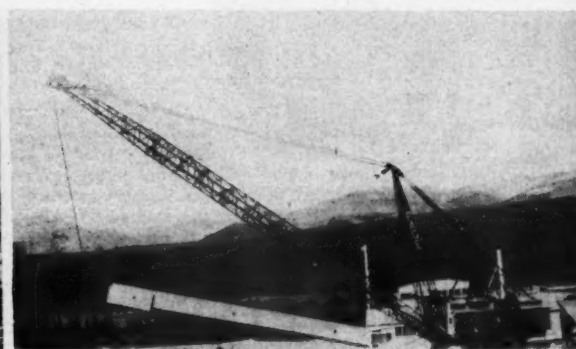
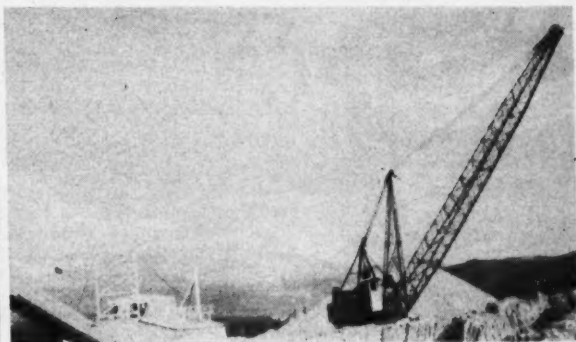
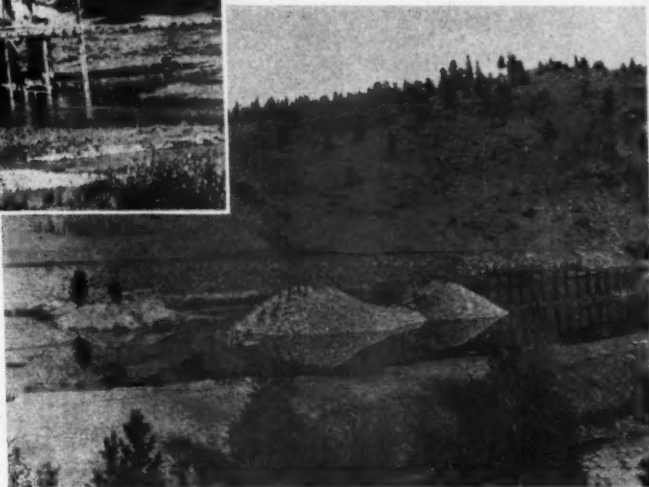
Placers Old and New

Since 1860 Placer Mining Has Been
One of Colorado's Important
Industries



(Above) Dredge hulk on Willow Creek, upper Taylor Park, Gunnison County.

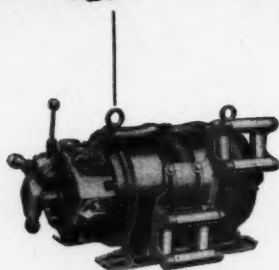
(Right) Hydraulic elevator pond on Pactolus placer, South Boulder Creek, Gilpin County. This operation was carried on during the nineties. Forty years later this placer yielded \$264,000 in gold during 2½ placer season.



(Above) Dry Pond of Timberline Dredging Co. No. 2 Dredge.
(Below) Cooley Gravel Company 1000 cu. yd. Bodinson dredge on Pactolus Placer, South Boulder Creek, Gilpin County. This dredge operated from 1937 to 1939 on 78 acres, handling 1,003,578 cu. yds. of 26.4 cents per cu. yd. average value.

Timberline Dredging Company's Dredge No. 2 on the Snowstorm placer, Park County. A 10,000 cu. yd. capacity Bodinson Dredge which started operations in 1942 and was closed down by Order L-208. Page walking shovel weighs 700,000 lbs., has 150 ft. boom and uses 8 cu. yd. bucket. Dredge has 7 ft. diam., screen 65 ft. long. Length of stacker supporting 42 in. belt is 140 ft.

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single lever
Airslusher!"**



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Here are other reasons why you'll find the Gardner-Denver Airslusher a better buy for long, hard service:

Five-cylinder air motors—high torque radial type—a lugger in low speed—vibrationless at any speed.

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Completely sealed—water or dirt can't get into the Airslusher! Lubricant is sealed in—water and dirt are sealed out.

WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

A LEGISLATIVE slowdown planned for the last half of April, as a form of Easter recess, has been abandoned by Congressional leaders who will now drive on for an early July adjournment. The House may manage to take an informal recess for a few days around Easter.

The order has gone out for rapid handling of the OPA extension bill, now reported by the House Committee on Banking and Currency and ready for handling on the floor. Senate hearings on the measure have also begun. Other bills to be disposed of include the British loan, minimum wage, strike control, stockpiling, stream pollution, possibly a "quickie" individual income tax reduction bill, and the departmental supply bills.

Action on Stockpiling

On March 12 the House Committee on Military Affairs considered the Thomas-May Strategic and Critical Materials Stockpiling Act, S. 752, passed by the Senate December 20, 1945, and appointed a subcommittee under the chairmanship of Representative Carl T. Durham of North Carolina to consider the measure. After intensive study and a subcommittee report, the full committee reported the bill April 2, with amendments.

In working on the amendments the subcommittee conferred with representatives of the American Mining Congress and of the Army and Navy. In its report the subcommittee stated that, "Representatives of the Army and Navy have asked for greater flexibility to permit obsolete materials to be disposed of without specific approval by the Congress. Such flexibility is provided by Section 3(e). Greater flexibility is not required and would, without any compensating advantage, cause serious detriment to the mining industry. The existence of discretionary authority to release stockpiled materials—except for war purposes, for rotation to prevent deterioration, or by reason of obsolescence—would present a grave threat

to the stability of mining operations and to the confidence necessary to maintain a sound and healthy mining industry. It would thus imperil our major source of many of these materials. The provisions of Section 3(e), under which Congress retains the key to the stockpiles, are designed to minimize this threat."

The changes in S. 752 as recommended by the subcommittee and reported by the full committee are: (1) instead of establishing a new agency to administer the stockpiling program, provision is made for administration by the Secretary of War and the Secretary of the Navy, as in the original Thomas Stockpiling Act of 1939; (2) instead of authorizing appropriations without limit the authorization is limited to \$1.8 billion with a specific limitation of \$360 million in each of the next five fiscal years; (3) instead of requiring that funds received on account of sales of materials be covered into the Treasury as miscellaneous receipts, it is provided that any such funds shall remain available for expenditure under the stockpile program; and (4) the section of the Senate bill which would have permitted duty-free importation of materials purchased from foreign sources for stockpiling has been deleted.

It is anticipated that the House may approve S. 752 and send it to conference by mid-April.

Premium Price Plan

A new policy applying to wage-price adjustments in the non-ferrous metals industry was announced by OES Director Chester Bowles on March 28. Offices of OPA and CPA as well as Director Bowles announce that price adjustments resulting from approved wage increases in copper, lead and zinc mining, smelting and refining operations will be taken care of under the Premium Price Plan.

Proposed modifications in the plan have reference to (1) low-cost mines whose costs previously would not have permitted them to be eligible for

Washington Highlights

CONGRESS: Will push on for an early July adjournment.

STOCKPILING: House committee reports amended bill.

COPPER, LEAD, ZINC: OES would meet wage costs through Premium Price Plan.

OPA EXTENSION: Administration leaders press enactment.

MINIMUM WAGE: Senate approves 65 cent minimum.

CASE BILL: Weak substitute reported to Senate.

COAL NEGOTIATIONS: UMWA stalls in hope of Government participation.

SILVER SALES: Consumers clamoring for cheap Treasury silver.

quota revision; and (2) all other mines. With reference to the former group it is stated that "the Quota Committee will upon application assign a revised quota calculated to yield an operating margin per pound of metal not less than the margin for the period 1936-1939, inclusive, provided there has been no substantial change in the grade of ore mined." The proposed treatment contemplates that where there have been substantial changes in the grade of ore, or 1936-1939 operations were not comparable to present operations, adjustments will be made to yield the hypothetical margin that would have been earned in 1936-1939. In case of mines in the latter class revised quotas will, on application, "be calculated to give no diminution of margins as a result of current wage increases."

A maximum payment of 14% cents per pound for lead is to be permissible under a contemplated broadening of the B quotas. With the current ceiling price of 6½ cents per pound and "A" premiums of 2% cents, the "B" premium under this arrangement may vary from 0.1 cent to 5.5 cents. A similar broadening is made in copper premiums under which

mines producing more than 2,000 tons in 1942 may receive premiums bringing the total price to 22 cents a pound, at the discretion of the Quota Committee.

Meanwhile, as the result of existing and threatened work stoppages in the non-ferrous industry, the Secretary of Labor has appointed a fact-finding board consisting of George E. Strong, a Washington, D. C., attorney, (chairman); Judge James H. Wolff of Utah Supreme Court; and Dr. Carl Borgmann, University of Colorado Chemical Engineering Department.

Price Control Extension

The House Committee on Banking and Currency, after six week of hearings is now considering in executive session numerous amendments which are being offered to the Spence bill for extension of OPA to June 30, 1947. Administration witnesses have predicted dire results from too early a lifting of price controls, while industry witnesses in the main have called for the removal of price ceilings and restoration of a free market. It will be remembered that the Spence bill calls for the continuation of premium price payments on copper, lead and zinc, but without any increase in ceiling price and without the non-cancelable provision.

An amendment by Representative Brown of Georgia, approved by the committee in executive session, requires that "the Price Administrator (and the Secretary of Agriculture) shall proceed immediately to formulate a comprehensive plan for the progressive removal of price controls and subsidies in order that the return to a free market and to free collective bargaining may be accomplished on or before June 30, 1947, without disturbance of the national economy." Definite stipulations which the committee has accepted for the bill are (1) price controls are to be removed on commodities upon satisfaction of domestic demands therefor; (2) the President each month shall determine whether domestic demand for various commodities has been satisfied, and wherever he determines that the demand is satisfied "he shall forthwith certify that fact in writing to the Price Administrator"; (3) upon receipt of this certification, the Price Administrator must act within ten days "to remove all price controls with respect to such commodity or class of commodities"; (4) the President is given the major responsibility for decontrol, but the OPA Administrator may remove price ceilings on his own initiative; (5) whenever the supply of a commodity, already decontrolled, falls short of demand, it may be put back under price control, upon certification of the President to the OPA that supply and demand are out of balance.

Senate Banking and Currency Com-

mittee hearings on OPA extension are expected to begin shortly.

Minimum Wage Bill

After two weeks of hot debate the Senate passed the Pepper Minimum Wage Bill, S. 1349, discussed last month. The amendment by Senator Ellender, of Louisiana, which would have held the minimum wage to 55 cents, increasing to 60 cents after 18 months, was swept away and replaced by a straight minimum wage rate of 65 cents per hour. This was brought about by the advocates of the amendment by Senator Russell of Georgia, permitting farm labor costs to be included in the computation of parity prices. The 65-cent minimum attracted enough labor votes to keep the Russell amendment in the bill although it is well known that this parity price amendment is threatened with a White House veto. In the tangled parliamentary situation during the Senate battle the two-year limitation on suits for back pay and "damages" originally contained in S. 1349 was stricken out.

A determined effort by Senator Ed Johnson of Colorado to add provisions similar to those contained in the Gwynne bill, now pending on the House calendar, was unavailing. Such an amendment would limit suits for back pay and "damages" to one year, and permit a court to reduce damages in whole or in part upon an affirmative showing by the employer that the violation was not wilful and that he acted in good faith. Another valuable provision of the Gwynne bill which Senator Johnson offered is, "that no liability shall be predicated in any case on any act done or omitted in good faith in accord with any regulation, order, or administrative interpretation or practice, notwithstanding that such regulation, order, interpretation or practice may, after such act or omission, be amended, rescinded or be determined by judicial authority to be invalid or of no legal effect."

Case Bill

A spineless labor disputes bill was reported by the Senate Committee on Education and Labor on March 19. While the bill bears the number H. R. 4908 under which the Case bill, discussed in last month's issue, came over from the House, it carries none of the vital sections of that measure. As rewritten by the Senate committee, it sets up a five-man Federal Mediation Board, services of which would be available after failure of the usual conciliation and mediation efforts. In case efforts of the Board at mediation fail it would endeavor to bring the matters in dispute into voluntary arbitration.

One interesting provision of the bill as reported would cause the Bureau of Labor Statistics to maintain

a file of all available collective bargaining agreements, and of all mediation, conciliation and arbitration agreements and awards in labor disputes. The Bureau would be authorized to furnish employers and employees all available data that might be of assistance in the settlement of labor disputes.

It is rather apparent that administration leaders in the Senate intend to delay consideration of H. R. 4908, but if and when the measure is taken up, determined efforts will be made to restore the Case bill provisions requiring (1) mutuality of responsibility under collective bargaining agreements; (2) application of penalties where violence or coercion are employed in union organizing activities or in labor disputes; (3) that the provisions of the Wagner Act be denied to unions which include supervisory employees in their membership; and (4) removal of Norris-LaGuardia Act protection where the boycott is employed in jurisdictional disputes.

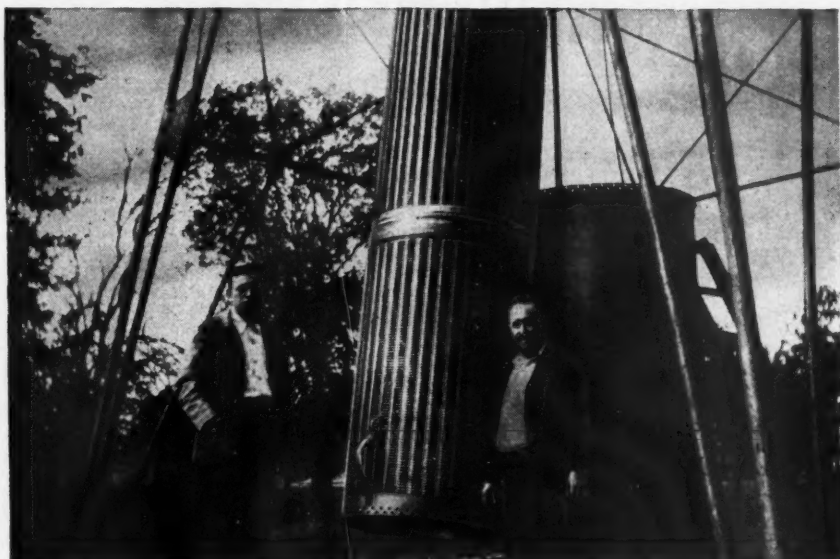
On March 7 the National Labor Relations Board issued a 2-to-1 decision in the Jones and Laughlin mine supervisors' case. The Board ruled, in effect, that the guarantees of the Wagner Act apply to supervisory employees who organize into unions of their own choosing and seek to bargain collectively with their employers, even though such unions include rank and file employees. This case originated in the well known District 50, UMWA disputes at the company's coal mining properties.

Board member Gerard D. Reilly in an able dissenting opinion said the decision "so seriously distorts the principal objectives" of the law that "unless it is immediately corrected by legislative or judicial action, it will have far-reaching repercussions upon industry and labor." He added "in reaching this result, it is probable that we have seriously impaired the ability of the operators effectively to manage their mines. . . . To me its impact upon the rank and file is equally catastrophic."

Coal Contract Negotiations

Although the bituminous coal operators and miners began negotiations for a new wage contract March 12, nothing approaching an agreement has been reached and the workmen have remained away from the mines since April 1. Demands of the miners have centered around a "health and welfare fund" which is really the old participating royalty demand of a year ago. No specific demands have been made with respect to wages and reduction of working hours. Still very much in the picture are the miners' demands for unionization of supervisory employees and for what they term improved safety and compliance with mining law.

(Continued on page 89)



The FOURTH Everdur Well Screen installed for the City of Elkhart...

NINE YEARS AGO the Layne-Northern Company, Mishawaka, Indiana, installed two wells for the City of Elkhart . . . using well screens made of Everdur*. Because of the high strength and corrosion resistance of this copper-silicon alloy, these two wells have shown no appreciable drop in water yield, although wells with screens of other materials became clogged in a relatively short time.

Two more wells subsequently installed by Layne-Northern were therefore equipped with Everdur. The snapshot above shows the latest installation, with an Everdur well screen ready to be lowered into position. Standing by are Mr. Richard B. Corns (left), Waterworks Superintendent, and his assistant, Mr. Swartz.

The performance of these Everdur well screens is typical of the service rendered by equipment made of this tough, corrosion-resistant alloy . . . installations of which are still in service after 18 years. For detailed information, write for Publications E-11 and E-6.

*Reg. U. S. Pat. Off.



38" diameter well screen fabricated of Everdur 1010 sheet, .203" thickness and welded with Everdur rod. Fourth installation made for the City of Elkhart, by Layne-Northern Company, Mishawaka, Ind., affiliate of Layne & Bowler, Inc., Memphis, Tenn.



Everdur

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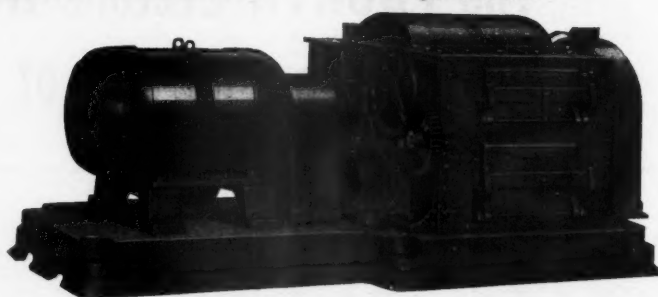
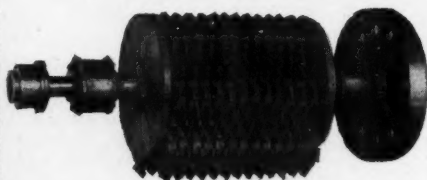


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Each shredder ring (shown above) has 20 cutting edges. The many shredder rings, on the heavy rotor (shown below), revolve freely, each on its own shaft. They deflect from tramp metal—eliminating the bother with shear pins or conventional safety devices.



Nothing could better demonstrate why *American Shredder Ring Crushers produce fewer fines*—than the example of splitting coal with a pick-axe compared to crushing it with a sledge hammer.

It's the *splitting* action of the cutting edges of American's shredder rings that produces uniform sizes with a minimum of fines—and no oversize.

The *high tonnage output* of Americans is attained by the very rapid reducing action of the many cutting edges in motion. American's low power consumption (less than $\frac{1}{2}$ hp per ton) is achieved through its use of *powerful centrifugal force*—the rotor revolutions *plus* the independently revolving shredder rings.

Americans operate at a total cost of less than 1c per ton!

Send now for the "AC" bulletin on coal crushing data and crusher specifications.

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Personals

Retirement of P. G. Beckett, vice president of Phelps Dodge Corporation, effective May 1, was recently announced by L. S. Cates, president, at the New York offices. Harrison M. Lavender will succeed Mr. Beckett with the title of vice president and general manager, assuming direction of all western operations of Phelps Dodge. Mr. Cates announced that Mr. Beckett would continue as a director of Phelps Dodge. Mr. Beckett's retirement concludes more than 41 years' active service with Phelps Dodge.

M. H. Forester, vice president of the Consolidation Coal Company, in charge of Kentucky operations, has been appointed chief of the coal and non-metallic mining section, industry branch, economics division of the office of Military Government for Germany. In this position he will be responsible for the administration of the coal problems in the U. S. zone of occupation.

Cecil Fitch, Jr., has been made assistant manager of Chief Consolidated Mining Co., Eureka, Utah. Harold B. Spencer has been made general foreman. Cecil Fitch, Sr., is president and general manager.

J. P. Horne has been named general manager of the Jewell Ridge Coal Company, succeeding H. D. Smith, resigned. Mr. Horne was formerly general superintendent of the Raven Red Ash Coal Company, of Raven, Va.

Bryan C. Parks has been named associate professor of geology in the research bureau of the University of Arkansas. He will study limestone, coal, and clay deposits for industrial utilization. Since 1939 he has been on the professional staff of the Illinois Geological Survey.

L. S. Hayes, formerly analytical engineer with OPA in Washington, has joined the staff of the American Smelting and Refining Company's mining department in New York City.

John C. Draper, recently released from military duty, has returned to his position as mining engineer for the Island Creek Coal Company.

Ray Jenkins, formerly with the research and operating department of Anaconda Copper Mining Company, Butte, Mont., has been named field manager of the Montana division of Sullivan Machinery Company.

Milton H. Fies, consulting engineer, Birmingham, Ala., has been named manager of coal operations for the Alabama Power Company. Mr. Fies was associated for 32 years with the



DeBardeleben Coal Company and resigned as its vice president in 1944 to establish his consulting business. During the intervening time he has continued his services to DeBardeleben as well as Alabama Power in a consulting capacity.

Carl A. Zapffe, formerly on the staff of Battelle Memorial Institute, has opened a consulting office and research laboratory at 6410 Murray Hill Rd., Baltimore 12, Md. Mr. Zapffe is specializing in research programs, metallurgical problems, defects in metals, electrochemistry, welding, gas-metal systems, stainless steels and fractography.

Vernon C. Rogers has been appointed mine superintendent for the Pacific Coast Borax Company's mines at Boron, Calif. Mr. Rogers has been chief engineer for the Climax Molybdenum Company at Climax, Colo., for the past 10 years. Prior to that time he worked in northern Minnesota in open pit mining and construction. Mr. Rogers also spent several years in the Central American States.

Dr. Charles F. Park, Jr., well known mining geologist of U. S. Geological Survey, has just been appointed professor of geology at Stanford University, where he will be in charge of teaching and research in the geology of ore deposits and ground water. Dr. Park has been in charge of the section of metalliferous deposits of the U. S. Geological Survey and in 1944-45 was geologist in charge of the U. S. Army Engineers' examination of Germany's mineral potential.

Sumner Simpson, president of Raybestos-Manhattan, Inc., announced that effective March 1, Harry E. Smith, of the Manhattan division, Passaic, N. J., corporation vice president, assumed complete charge of corporation rubber product sales and marketing.

William J. Jenkins, president and general manager, Consolidated Coal Company, has been elected chairman of the board of the Mutual Bank & Trust Company, St. Louis, Mo.

Arthur J. Olson, heretofore district sales engineer for Link-Belt Company at Chicago, has been appointed district sales manager at Kansas City, Mo., to succeed Max Giffey, who has resigned after 40 years' service with the company. Mr. Olson has been in the employ of Link-Belt Company since 1918, at the Pershing Road plant in Chicago.

Morris C. Scherer, who returned to the States last spring after a long confinement in prison camps in the Philippine Islands during the Japanese occupation, has been named superintendent of the 2,000-ton manganese concentrator on Polk Bayou in the Batesville-Cushman area in Arkansas.

The Solid Fuels Administration for War has announced the resignation of William F. Hahman as assistant deputy administrator in charge of distribution and transportation. William G. Caperton, formerly chief of the Bituminous Distribution Division has been appointed to succeed him. Mr. Hahman has returned to the industry in the capacity of vice president in charge of operations of the Juliette Coal Company, Pittsburgh, Pa.

Mr. Caperton began his career as a lawyer, but in 1914 went into the coal business with the New River Coal Company at Charleston, W. Va. After a wide experience in coal sales in West Virginia, Chicago, and the Southeast, in 1928 he became vice president of the company in charge of sales. In 1938 he became president of the Smokeless Coal Corporation in New York City, and on February 28, 1943, he entered Government service with the Solid Fuels Administration for War.

Gail A. Hathaway, of the office of Chief of Engineers, U. S. War Department, has been named vice president of the American Society of Civil Engineers, oldest national engineering organization in the United States, succeeding A. C. Polk, of Birmingham, Ala., who died recently. His succession, as senior director in the society's second zone, was announced by W. W. Horner, St. Louis, national president. Mr. Hathaway, a resident of Hyattsville, Md., has been active in sponsoring meteorological studies of flood-producing storms and is author of several works on meteorological studies.

Louis Barco, recently discharged from military service, has been appointed assistant mine manager of the Solar Mine of the United Electric Coal Co., near Rushville, Ill.

The appointment of H. Robert Hughes as assistant chief engineer in charge of raw materials has been announced by the Jones & Laughlin Steel Corporation. The raw materials division handles ore, coal, lime-



stone, river and lake transportation. Mr. Hughes joined the Jones & Laughlin engineering department in 1923 at the Aliquippa works. He has been handling general engineering and construction work and was project engineer for the Benson Iron Ore Mines development in northern New York.

W. B. Poindexter, formerly general sales manager of Pittsburgh Coal Co., and P. E. Francis, formerly vice president of North Western-Hanna Fuel Co., St. Paul, Minn., have been appointed vice presidents of the Lake Coal division of the Hanna Coal & Ore Corporation.

E. R. Galvin, formerly president of Tyson Bearing Corporation of Massillon, Ohio, has been named executive vice president, general sales manager and member of the board of directors of LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa. S. L. Myers, who has been vice president and general sales manager during the past year, will become vice president and export sales manager,

while Jay M. Feters, former export manager, will become manager of foreign development.

Philip Smith, for more than 20 years chief Alaskan geologist of the United States Geological Survey and a member of that organization for over 40 years, retired from the Government service on March 31, 1946. In the future Mr. Smith will make his home in Washington, D. C.

G. A. Shoemaker, operations vice president of the Pennsylvania mines of the former Consolidation Coal Company, has been named operations vice president of the Pittsburgh Coal Company, subsidiary of the recently merged Pittsburgh Consolidation Coal Company.

After 41 years in the service of the Phelps Dodge Corporation at Douglas, Ariz., A. W. Engelder, general auditor for the company, will retire. He will be succeeded by John Kuhn, who will have the title of assistant general auditor.

Fred Myers has been named safety and preparation engineer for the Virginia, West Virginia and Kentucky operations of Leckie Mines, Inc. Prior to his service in the armed forces, Mr. Myers was associated with the American Cyanamid and Chemical Corp.

T. L. Chapman will become manager of mining and milling operations of the Tennessee Schuylkill mine at Chloride, Ariz. For the last three years Mr. Chapman has been at Tucson with the U. S. Bureau of Mines.

Alan B. Cunningham, formerly assistant electrical engineer with the Pittsburgh Coal Company, has been promoted to electrical engineer. Mr. Cunningham has been with Pittsburgh Coal since 1934.

W. E. Romig, former general superintendent of the Climax Molybdenum mine at Climax, Colo., has returned to civil life after four years in the U. S. Engineers Corps. At the present moment he is on terminal leave at his home in Seattle, Wash.

The following changes in the operating department of Consolidation Coal Company have been announced by H. H. Hendry, personnel manager. A. C. Dittrick has been appointed preparation engineer of Kentucky coal properties, with headquarters at Jenkins, Ky. Formerly Mr. Dittrick was assistant general manager in charge of purchasing for W. H. Warner & Company, Cleveland, Ohio, and prior to that he was, for a number of years, preparation engineer for Hanna Coal Company, St. Clairsville, Ohio. R. L. Blake, formerly maintenance foreman at Mine 207, Jenkins, has been appointed superintendent of the central preparation plant for mines

in the Elkhorn field. Russell M. McDonough, former repairman, has been promoted to maintenance foreman. Everett Mullins, for a number of years repairman at Mine 204, Jenkins, has been promoted to maintenance foreman at the same mine. Carl Snowden and Patrick Jones have been promoted to section foremen at Mine 214, McRoberts, Ky.; Charles Mac Fields has been promoted to assistant maintenance foreman at this same property.

Clarence A. Fredell has been appointed manager of the mining division of E. J. Longyear Co., of Minneapolis, Minn. He succeeds J. Murray Riddell, who resigned last year to become professor of mining engineering at the Michigan College of Mining and Technology.

—Obituaries—

D. R. Swem, former manager of coal operations, Northwestern Improvement Co., died suddenly on



February 25, following a paralytic stroke. Mr. Swem had been retired from active service on December 1, 1945.

William H. Pitts, 60, Pioche, Nev., mining superintendent of the Amalgamated Pioche Mine and Smelter Corporation, died at Salt Lake City late in February. Interment took place at Alhambra, Calif.

George M. Laughlin, Jr., former chairman of the Jones & Laughlin Steel Corporation, died at his winter home at Lake Wales, Fla., on March 9. Mr. Laughlin spent most of his career in the steel business and at one time was superintendent of one of the Jones & Laughlin plants in the Pittsburgh area.

N. Clif. Hilton, executive manager of the abrasive wheel, diamond wheel and bowling ball departments of Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J., died March 14, in Glen Ridge, N. J. Mr. Hilton had been with Manhattan Rubber for more than 30 years.



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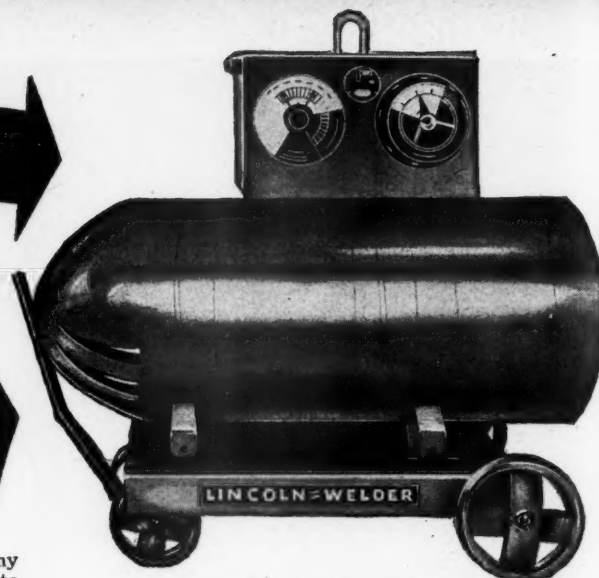
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Here is a chance to pick up arc welding equipment in any desired quantity at low cost. Large quantities of 300 to 400 ampere MG type welders—primarily of Lincoln and Hobart make—are available for sale. Largest inventories are in the Boston, Detroit, Cleveland, Chicago, Atlanta, Nashville, Houston and Philadelphia offices of War Assets Administration. They may be obtained, however, by contacting any of the War Assets Administration offices listed below. Equipment from 200 to 400 amperes in DC, gasoline-engine driven and AC sets are available in smaller quantities . . . also multiple operator types and related equipment such as electrodes, welding rods, weld positioners and flame cutters. Spot, seam and flash welders are likewise available. The equipment is for both production and construction. Write, wire or phone your War Assets Administration office today.

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- ☐ RESISTANCE WELDERS (spot) (seam) (flash)
- ☐ FLAME CUTTERS
- ☐ WELD POSITIONERS (capacity).....
- ☐ WELDING ROD OR ELECTRODES

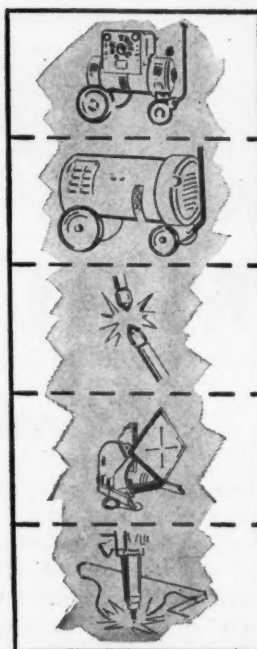
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176-1

NEWS *and* VIEWS



—The Evening Star.

Eastern



States

State Buys Mine Rescue Trucks

The state legislature of Pennsylvania has authorized Richard Maize, secretary of mines of Pennsylvania, to purchase three first aid and mine rescue trucks. Two men will be employed on each truck, one a mine rescue man and the other a first aid instructor. The trucks will be fully equipped with mine rescue and first aid equipment and will be stationed at Wilkes-Barre, Ebensburg and Uniontown. The crews will travel to mines in their areas to instruct mine officials and mine workers in mine rescue work and first aid. In addition, in the event of disaster the trucks will be available for emergency service.

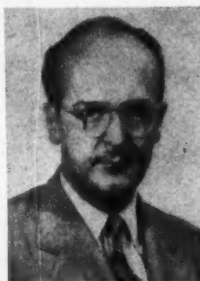
Annual Convention of Mine Inspectors

The 26th annual convention of Mine Inspectors' Institute of America will be on June 3-5 at the Sterling Hotel, Wilkes-Barre, Pa. Because, at the request of the Government, no meeting was held last year, it is expected that the meeting this year will be unusually large and well attended. The cooperation of the State Mine Inspectors' Association of Pennsylvania gives further assurance of a strong representation of the state's inspectors. Jack Ryan is chairman

of the program committee. C. A. McDowell, 427 Park Street, California, Pa., is secretary.

Handling of Industrial Waste and Stream Pollution Problems

Dr. R. E. Hall, director of Hall Laboratories, Inc., of Pittsburgh, consultants in conditioning of industrial waters has announced the establishment of a special department to handle



Chas. F. Hauck

problems of industrial waste and stream pollution. The new department will be headed by Charles F. Hauck, until recently engineer at Ravena Ordnance Center and previously, for five years, senior chemist and assistant to the superintendent of Southerly Sewage Treatment Plant of Cleveland. The program as planned is an extremely comprehensive one and embraces such features as the study of plant operation to reduce the volume of waste at its source, development of methods for treating industrial waste economically; fact find-

ing studies of the actual amount of deleterious waste discharged and stream contamination; and extension of the regular engineering service of the laboratories to include water and waste leaving the plant as well as water entering.

First Report of Consolidation Coal Company

The operations of Consolidation Coal Company and Pittsburgh Coal Company for the year of 1945, are reported upon in the first annual report since the two companies combined. Robert C. Hill and George H. Love, chairman and president respectively, reported on the long-range objective of the new company and asserted "we must be ready at all times to do everything possible to make the bituminous coal industry a better one in which to work and invest capital. Mining communities must continue to be made better places in which to live. Private ownership of homes by min-

PETER F. LOFTUS Consulting Engineers

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Oliver Building Pittsburgh, Pa.

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Mine Mechanization
Mine Management

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ing employees must be encouraged. In this connection, Pittsburgh Consolidation has either sold or arranged for the sale of 1,960 houses to employees on attractive terms. This policy will be continued because we want our people to join the company as property owners in these communities."

Pittsburgh Consolidation Coal operates 43 mines in Pennsylvania, West Virginia and Kentucky and has 15,484 employees. Total production from properties of the company in 1945 was 25,951,367 tons, including that mined by lessees.

General Somervell Elected President of Koppers

Gen. Brehon B. Somervell, commander of Army Service Forces during World War II, has been elected president of Koppers Company, Inc. Gen. Somervell is to assume his duties at the offices of the Koppers Co. in Pittsburgh about the first of May. Koppers has plants in 24 states and builds and operates coke and other by-products plants.

Coal Mining Men Meet

Members of the Central West Virginia Coal Mining Institute, at the first meeting of this year, held at the Elks' Home in Fairmont, W. Va., on March 14, heard technical papers presented by two coal authorities—George R. Higinbotham and E. F. Miller. Following this program a buffet supper was served. The meeting was filled to capacity. The April meeting will be held in Clarksburg, W. Va., on April 12.

MARSHALL HANEY, Ph.D.

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One Hundred Years of Coal Mining



The Borden Mining Company, which was established in Alleghany County in March, 1847, by William Borden, grandfather of the present head of the concern, is one of the oldest corporations in Maryland and one of the first to mine coal in the state on a commercial scale for railroad shipping. Albert G. Borden and Russel Y. Smith of New York, president and vice president, respectively, of the Borden Mining Company, have recently spent a week-end on an inspection tour of the company's property. Aside from owning extensive and surface land, the Borden Mining Company is also interested in clay deposits which are being mined by the Big Savage Refractories Corporation, Frostburg.

Railway Contract Awarded



Robert Gregg, president of the Tennessee Coal, Iron & R. R. Co., has announced that a contract has been awarded for the construction of seven and one-half miles of railroad to connect the company's new

Concord coal mine with other rail facilities of the company. A juncture will be made with existing tracks leading to the by-products plant and furnaces at the Fairfield cluster of operations. It is expected that this construction will require about eight months for completion. The company is planning a number of other improvements in their coal mining operations as well as their limestone and dolomite quarries, and plans are completed to install a new battery of modern coke ovens at the Fairfield coke works.

New Tunnel for Birmingham

The city planning board has approved the proposed tunnel through Red Mountain, in the city of Birmingham. This fits into the general plan for routing heavy through traffic around the city by means of a loop highway system connecting with all main highways. There are a number of good reasons for the construction of this tunnel, one being that of congestion in the downtown area of the city, and those interested in the tunnel are optimistic about its completion.

Since they are able to distinguish between high current value loads and short circuits, Type KSA circuit breakers re-close as soon as predetermined line conditions are met. They save production costs in lost man hours, power, maintenance and repairs.

KSA unattended substation circuit breakers provide automatic or semi-automatic protection and control for m-g sets, mercury arc rectifiers and rotary converters.


Get the full story, contact your nearest I-T-E engineering representative or write for Bulletin 2503.




I-T-E CIRCUIT BREAKER CO.

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New Phosphate Project

 Plans for immediate construction of a new phosphate mine and plant near Bartow, Fla., were announced March 25, 1946, by Louis Ware, president of International Minerals & Chemical Corporation. Annual production is anticipated as one million tons and operations are scheduled to begin July 1, 1947. The plant will be built on the 2,000-acre phosphate property recently purchased by the company and will be the largest and most modern phosphate mining operation in the United States. The new development will be called the Noralyn mine which is considered by metallurgists to be one of the richest phosphate deposits in the country.

New President for Climax

 Arthur D. Storke will assume the office of president of the Climax Molybdenum Company in June, 1946, replacing Max Schott, who is to retire. Mr. Storke is no stranger to Climax operation as he was formerly with the company in 1917 and 1918 as well as later from 1924 to 1928 when he was in charge of the operations in Colorado.

Production from mine and mill at Climax, Colo., in pounds of molybdenum throughout the war years are now available as follows:

1939.....	21,785,800
1940.....	22,778,857
1941.....	27,751,272
1942.....	41,852,136
1943.....	46,133,715
1944.....	23,608,421
1945.....	18,325,041


New Method of Fighting Fires

Use of artificial fog as a weapon against fire may result in the saving of millions of dollars worth of property annually from fire and water damage. The fog is generated by water under high pressure forced through a specially designed nozzle and it has been found that the fog which results puts out many fires more efficiently than does a solid stream of water, and in addition, causes less water damage.

A new fire hose, small in diameter and light in weight yet designed to withstand 800 lbs. working pressure, has been developed by United States Rubber Co., for fighting fire by this new method. Fred Shepherd of New York, engineer manager of the International Association of Fire Chiefs, states that fog is particularly

effective against burning oil and other inflammable liquids. A blanket of artificial fog spreads over a fire quickly and cools the zone of combustion while the steam produced aids in smothering the flames. Firemen approaching a fire behind the fog are protected against heat, smoke and possible burns. Investigations are under way to experiment with the use of artificial fog in the control of coal mine fires.

New Jersey's Buried Treasure

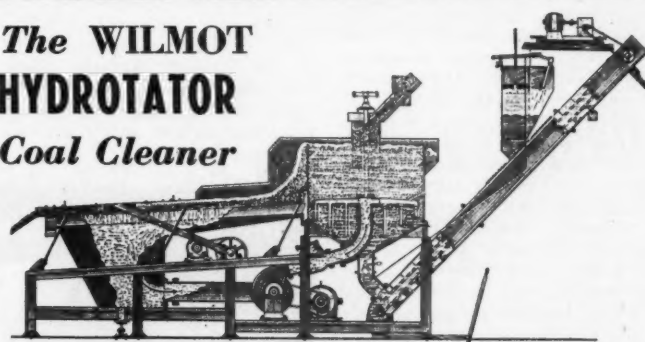
 The New Jersey State Chamber of Commerce has recently published a booklet entitled "New Jersey's Buried Treasure." This booklet may be secured by writing the New Jersey State Chamber of Commerce at 605 Broad Street, Newark 2, N. J. The mineral resources of New Jersey are amazingly diversified and to the layman, rather startling for so small a state. This little illustrated booklet gives a brief review of these resources and information on mineral research as carried out at Rutgers University by the Bureau of Mineral Research under the direction of Dr. Alfred K. Snelgrove.

Experimental Mine Conveyor Belt

A NEOPRENE conveyor belt has been in use for 18 months raising slate, rock, shale, some coal, dirt and water from the breaker of a bituminous coal mine. The test experience of this belt under extreme service conditions is now available as result of the operation.

The Rubber Chemicals Division of E. I. duPont de Nemours and Company reports that this belt has handled approximately 225,000 tons of material and that the carcass shows very little wear and will continue to give service indefinitely. In the test the belt was heavily loaded, requiring 75 hp. to propel it at its operating speed of 248 ft. per minute. Abrasive action was greatest at the loading end, but, since the lift was on a 19-degree degree slope, all parts of the belt were subjected to abrasive wear. The test appears to have been a comprehensive one and the nature of the material conveyed was such that many sharp cutting edges were present to scar the belt. Neoprene belts may have one advantage for use in the coal industry in that neoprene has excellent chemical resistance to sulphur.

The WILMOT HYDROTATOR Coal Cleaner



→ Hits a NEW HIGH in Automatic Control of the Preparation Process

Now, due to recent engineering developments, Wilmot Hydrotators afford an even higher degree of automatic control. This action, together with other new mechanical features, further emphasizes the Hydrotator's superiority in coal preparation efficiency.

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A GREAT NAME IN
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HYDROTATOR Preparation EQUIPMENT

WILMOT ENGINEERING COMPANY, HAZLETON, PA.



New Use for Spoil Banks



The Ohio Reclamation Association is utilizing the spoil banks in the strip mine areas for a tree-planting program. The Association is planting many thousands of trees on the turned-up soil in the coal strip areas which will be ideal for the quick growing of timber. As planned, the Association will have in the future a forest of sufficient trees to allow the careful cutting of props and lumber for use underground in coal mines throughout the state. By utilizing the spoil land resulting from strip coal operations, the Ohio Reclamation Association is thus providing for a future timber supply as well as using land that otherwise would lie idle.

Navy Award to Battelle

In recognition of "distinguished service to naval ordnance development," Battelle Memorial Institute, Columbus, Ohio, has been presented the Naval Ordnance Development Award by the Navy Bureau of Ordnance. In addition, some 40 members of the Battelle staff have received individual awards from the Bureau of Ordnance for the special parts they played in the prosecution of naval ordnance research. The Naval Ordnance Development Award is the fifth of a series presented the Institute in recognition of its war service. The Institute has also received recognition and awards from the War Department, and the Office of Scientific Research and Development.

Cleveland Capital in New Iron Ore Venture

Reports from Cleveland indicate that a new high-grade iron ore deposit is to be developed at the head of Lake Huron. Although on the Canadian side, mines in this locality will be the nearest source of ore to lower lake ports. The property that is mentioned most frequently is that of the Westland Mining Co., Ltd., about 40 miles from the port of Blind River, Ont., and 80 miles east of Sault Ste. Marie.

Cleveland capital is understood to be interested in the venture but to date there has been no announcement

as to who is providing money for development.

The Westland Mining Co., Ltd., is named for James Westland Ferguson, a Toronto mining man, who has been drilling this iron property. These claims are regarded as part of the Algoma district and Ferguson and his engineers believe that drilling to date has shown the existence of a large block of high-grade ore on the Westland property. There is no definite information available as to the grade of this ore.

Stock Pile

Between 6,000 and 7,000 carloads of strategic nickel, chrome and other ores have arrived at a U. S. Government reservation at Ravenna, Ohio. This is part of a big reserve of critical war material which will be stored at Ravenna permanently as a stockpile. Less expensive ores will be piled in the open, but Col. S. R. Stribling, commanding officer of the reservation, stated that the more valuable ores, such as nickel, would be stored in large surplus oil tanks which are being erected on the grounds.

Program of Calumet and Hecla



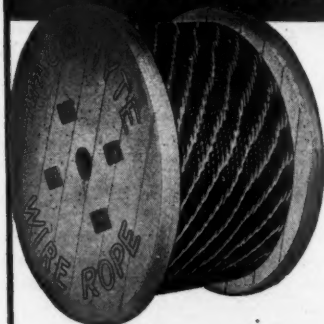
In the annual report for the year ending December 31, 1945, the Calumet and Hecla Consolidated Copper Company analyzed the outcome of diamond drilling operations throughout the year. The results on the recently acquired Clark and Keweenaw copper lands in the Copper Harbor area were less encouraging than indicated by reports of previous drilling by other interests. Exploration and development at Iroquois No. 1 shaft continued to show a lode of spotty mineralization which, under favorable conditions, might be considered as commercial ore. Allouez No. 3 shaft reaching the 11th level at the end of the year may contain possibilities as a commercial orebody but this cannot be determined until greater depth has been reached.

Production Increase at Homestake



With the gradual return of miners to work at Homestake Mining Company, president D. H. McLaughlin reports production was increasing although at the end of the year the mine was only working on half capacity. General Manager Guy N. Bjorge said ore handled was chiefly low grade, running \$6.27 a ton, and was taken mainly from caving operations on the upper levels. Reserves of developed ore, he said, are 18,979,000 tons.

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Mill Depots: New York, Pittsburgh, Chicago, St. Louis, Portland, Seattle, San Francisco. Distributors throughout the U. S. A.

Allis-Chalmers Outlines Its 1945 Developments for Mining

A NUMBER of new developments in 1945 of special significance to the mining industries are summarized by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., in its latest annual engineering Review, soon to be released.

In line with these developments, a new 60-in. by 14-ft. 7-in. heavy-duty apron feeder has been devised for use with large jaw and gyratory crushers, to withstand the impact of large sizes of rock and ore, according to the Review. An apron, consisting of overlapping manganese steel or steel plate pans and heavy cast steel links with removable bronze bushings, is supported on full-width steel rollers closely spaced at feed end where material is dumped.

The head shaft and head shaft sprocket are integrally cast and equipped with 21 sprocket teeth in order to increase width of contact area between sprocket teeth and links.

The importance of using a feeder before a jaw or gyratory crusher to control feed, increase capacity, and avoid bridging of large pieces in the crushing chamber is illustrated in installations where the primary crusher is idle about 50 per cent of the time through non-use of a feeder, the Review points out.

Preliminary ball mills are, by preference, replacing the traditional long multi-compartment mills for raw grinding. These preliminary mills operate at relatively high circulating loads up to 400 per cent in conjunction with mechanical classifier, the overflow from which constitutes a finished raw material product of approximately 92 per cent minus 200 mesh. When this short mill is applied to the classifier circuit in single-stage closed circuit wet grinding, the flow is simple, direct, and requires no auxiliary elevators, conveyors and pumps.

A new log washer for use on many ores containing medium amounts of clay, silt and other foreign matter, consisting essentially of two steel logs with steel paddles, a steel tank, motor or gasoline type power unit, Texrope drive, herringbone speed reducer, and reduction gears for driving logs, all mounted on one frame, is described in the Review.

Also mentioned in the Review is a new 5 kv. air contactor which has been designed for extremely severe motor starting duty as found in hoist service, industrial plants and mills. Designed on the clapper type principle and completely oil-less, the new contactor has powerful magnetic blowouts to snuff out arcs quickly and low mechanical inertia to reduce wear.

Low-head transformers and rectifiers for mine service were designed and built during the year.

The Review also points out that large mine hoists having control for both manual and semi-automatic operations are receiving more attention. The semi-automatic operation without an operator at the hoist involves a dc. hoist motor which receives power from a motor-generator set and a Regulex control. Operation is very smooth, with Regulex exciter control-

ling voltage, current and speed within predetermined limits.

The new crushing and grinding pilot plant for mineral testing—largest of its kind set up by any manufacturing concern in the country—was completed in 1945. Operation of the plant permits treating large samples of ores and minerals by practically all of the known commercial processes, thereby supplying customers with valuable information which could not be obtained solely from small-scale batch tests.



Good Tamping
Makes Explosives
More Effective

SMOKE and FUMES—REDUCED *The Modern Way!*

Improper stemming or too much powder cause blown-out shots and excessive underground fumes and smoke—resulting in loss of time and shot effectiveness. "The Modern Way"—the use of SEAL-TITE tamping bags for tamping encourages good stemming and a better seal—reducing safety hazards while giving better shot control and bringing down more coal.

A new, heavier, chemically-treated moist-proof bag—the SUPER SEAL-TITE bag is now available as well as the regular SEAL-TITE bags. The "SUPER" bag allows for longer underground storage of bags, filled or unfilled, without breakage of the paper from damp or wet conditions.

Make your own tests. We'll send the samples to you—Free. Write us today specifying the regular or SUPER SEAL-TITE bag and the bore hole size you use.

TAMPING
BAG COMPANY

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Mesaba Open Pit Mine to be Opened This Year



Inland Steel Company and Cleveland-Cliffs Iron Company have announced that The North Wade open-pit iron mine near Kinney, Minn., on the Mesaba Range will be brought into production by a joint operation of the two companies this season. Stripping will commence as soon as orders have been filled for shovels, trucks, and the other needed equipment. The North Wade Mine was acquired by Inland Steel in 1945 and under the terms of an agreement will be operated by Cleveland-Cliffs Iron Company.



Twenty-five-yard Marion dragline in operation at Wilmington No. 10, Northern Illinois Coal Corp.

Lower Grade Iron To Be Used

Once the snow is gone and the ground has become firm, it is understood that surveying will be started for a plant located near Babbitt, Minn., for the beneficiation of lower grade ores in that region. Reports are that Allis-Chalmers is building machinery for a \$25,000,000 plant which would operate on ores formerly mined by the Mesabi Iron Co.

Sale of Sullivan-Larkin Iron Mine

Zontelli Brothers of Ironton, Minn., and E. W. Leach of Duluth, have purchased the Sullivan-Larkin iron mine at Virginia, Minn., on the Mesabi range. The mine is an open pit which was formerly operated by the Inter-Range Mining Co., C. H. Taylor, president. The Sullivan-Larkin

property was equipped with a complete screening and washing plant, including double-deck vibrating screen and an Akins classifier. The Zontelli Brothers and E. W. Leach are well known in Minnesota iron mining circles as they have participated in the development of numerous operations throughout the iron ranges in the past.

PARMANCO Horizontal Drills

PARMANCO Horizontal Drills are used exclusively in the Iron Range for horizontal drilling.

They are also used by a large percentage of the strip coal mines.

The new PARMANCO Vertical Drill has revolutionized test drilling.

Write us your drilling problems.



PARIS MANUFACTURING CO.
PARIS, ILLINOIS

Solvay Sales Opens Houston Office



Solvay Sales Corporation has announced the establishment of a new office at 847 M & M Building, Houston, Tex. This new office will be in charge of Col. S. O. Taylor and will cover the states of Texas, New Mexico, and Arizona.

Eagle Picher Recovers Germanium



Germanium is taking its place as one of the most unusual metallurgical finds of recent years. The Eagle Picher Lead Co. is recovering germanium from zinc and lead ores. Five years ago this metal sold for \$4,500 a pound and today the price is \$200 a pound with production somewhat under one ton a year. Germanium is a by-product of cadmium recovery, itself a by-product of zinc processing. About ten pounds of germanium is found in every 15,000 tons of ore. Germanium is extremely light in weight with unusual hardness and a high resistance to corrosion. Its major use today has been for radar electronic devices. When germanium is alloyed with magnesium, aluminum, gold and platinum it gives these metals new properties.

DIG and HAUL at LOWEST COST



High pile of screenings is reclaimed to washery at rate of 300 tons per day by small Sauerman Scraper.

ON work where materials are to be moved distances of several hundred feet or more from pits, ponds, banks or stockpiles, a SAUERMAN Drag Scraper or Cableway is a great money-saver because it will dig, haul and place the materials in one operation.

Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will take 15 cu. yds. at a bite and move this big load a distance of 300 ft. in about one minute.

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HOLMES SHEAVE WHEELS

Holmes' Bicycle Type Head Sheaves are a heavy duty, light weight wheel, designed to eliminate undue bearing wear and avoid high inertia which consumes unnecessary power. Renewable steel liners with bolts locked against turning. Rim and liner full machine turned in the groove for true running and saving of rope wear. Hub ends machined for true running against bearings.

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ROBERT HOLMES AND BROS.
BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES
DANVILLE, ILLINOIS

FOR
MODERN MINING



These high quality, cast, all-steel spoke sheave wheels may be had in a wide range of sizes, for either single or double strand operation. They are full machine turned in the groove to give longer rope life. Hub ends perfectly machined to insure perfect alignment of bearings. May be had with or without bearings.



Large Vanadium Lode Reported



A large deposit of roughly one million tons of 5 per cent vanadium ore has been reported from the Hermosa-Barlow creek lode near Rico, 35 miles northwest of Durango, Colo. The ore-bearing formation extends northward beneath Barlow creek and the Dolores river and on the watershed of the Miguel river, five miles west of Telluride. It was reported that The Vanadium Corporation of America has taken over 72 claims in this area. The ore is supposed to be exceptionally high in uranium content. There has been no concrete confirmation of this discovery by Colorado authorities to date, despite considerable publicity given to the find in Colorado newspapers.

Increased Activities in Leadville District

American Smelting & Refining Co. has been rehabilitating the Garbutt mine located behind Fryer Hill, east of Leadville. This mine has been unworked for almost ten years and

A. S. & R. crews are retimbering the shaft and a new hoist has been installed. Some diamond drill work is also anticipated on the property. This project is known as Ibez Sunday Garbutt group and Sergi Zelinof is in charge of operations. In addition a new Leadville milling unit of A. S. & R., formerly of the California Gulch mill, at the foot of Harrison Avenue, is receiving lead-zinc ore from local mines and shippers throughout Colorado, including Silverton and Canon City. A. S. & R. is also continuing activities in the Kokomo region.

Better Times Predicted for Cripple Creek District

Merrill E. Shoup, president of the Golden Cycle Corporation anticipates more prosperous times in the Cripple Creek district. Mr. Shoup believes that as soon as manpower is available, increased tonnages can be expected from the camp. It has been announced that the Cresson Mine would reopen on April 1 and since this announcement was made there has been renewed optimism in the district.



Hough Payloader with one-yard shovel moving tungsten ore into an International KS-7 truck west of Boulder, Colorado

Silver King Reelects Former Board



At the annual stockholders meeting of the Silver King Coalition Mines Co., the former directors were reelected for the coming year. They are David Keith, Robert T. Banks, Edgar A. Bering, J. F. Fitzpatrick, George Jay Gibson, Jay T. Harris, Mearle G. Heitzman, James Ivers and Thomas F. Kearns.

Mountain Mines to Explore New Veins

The Mountain Mines Company is planning for 700 ft. of exploration work on the firm's property located southeast of Salt Lake City in the Big Cottonwood mining area. Equipment is being reconditioned and preliminary work has started on the property. Two exploration programs are being planned: one on the Silver King vein and the other on the Waterfall vein. The work will be under the direction of Kenneth L. Fields of Midvale, Utah.

Lease of Property in East Tintic District

Chief Consolidated Mining Company, in its annual report, shows a small profit before depreciation, and the leasing of one of the company's properties to the Newmont Mining Company.

The lease granted to the Newmont Company is on a portion of the Apex Standard property, situated in the East Tintic district of Utah. While considerable exploration work has been done at the East Tintic property, a large section remains undeveloped.

New Mexico Miners and Prospectors to Meet



The annual convention of the New Mexico Miners and Prospectors Association will take place on Friday and Saturday, April 19 and 20 at the Hilton Hotel in Albuquerque, N. Mex. Horace Moses, president of the New Mexico Miners and Prospectors Association, predicts the April meeting at Albuquerque will be the largest attendance since the association was organized. Many post-war problems of the mining industry will come before the two-day sessions, and the committee on resolutions will make some specific recommendations for the benefit of mine owners and operators. Federal and state officials will address the meeting, according

to Secretary R. H. Downer, who is awaiting completion of the program by a special committee.

Mogollon Region Showing Increased Activities

The historic Mogollon gold-silver mining camp in Catron County is showing increased activity, with the reopening of precious metal mines. Development work is expanding at the properties of the Silver Creek Mining Company. Bradley Mining Company of San Francisco is rushing construction of its new camp, preparatory to exploration and development operations on a major scale. There is also much activity by small operators and individual prospectors, with some promising strikes reported.

New Safety Campaign Shows Results

State Mine Inspector Warren Bracewell, and his assistants, have been carrying on an extensive safety campaign to set a new low record in 1946 for fatalities and lost-time accidents in New Mexico mines. Bracewell is making more frequent inspections in every active mining district and reports that already fatalities for the first two months of this year show an encouraging decrease, totalling only three workers, compared to five for the same period a year ago. Mining companies are installing new safety equipment and are conducting intensive safety meetings of employees.

Block P Mine Purchased by A. S. & R. Co.

The Block P Mine near Hughesville in Cascade and Judith Basin Counties has been purchased by American Smelting & Refining Company. The property was formerly operated by the St. Joseph Lead Co., who sold it to Thorson Bros. At the time St. Joseph Lead was running the Block P, a 400-ton-per-day mill, located on the property to treat lead and zinc ores.

Gold Property May Resume Operations

Engineers are making a reconnaissance of the property of the Ruby Gulch Mining Company, near Zortman, Phillips County. This is a gold property which, before Order L-208 became operative, employed 110 men. As yet no definite date has been set for resumption of operations. The property is equipped with a cyanide leaching plant, a Diesel power plant

and a 300-ton coarse-grinding unit. Carl J. Trauerman of Butte is president of the company.

New Mill at Superior

Milling operations have started at the new 100-ton mill at the King & Queen Mine at Nancy Lee Mines, Inc. This mine is located at Superior, Mont., and is under a ten-year lease to E. G. Smith of Wallace, Idaho and Robert E. Brown of Kellogg, Idaho. At the moment, mill feed is coming from the upper workings of the mine and is trucked to the mill.

New Mill to be Erected at Herbert Property

At Herbert Gold Mines located on Prospect Creek four miles southwest of Libby, Mont., a new mill will be constructed this spring which will handle eventually 250 tons of ore per day. This property has been idle throughout the war and contains commercial quantities of gold and silver with enough lead to justify extensive development work. The company is considering two milling plants—one for flotation and the other for cyanide.



ANOTHER JOB-PROVED DENVER "SUB-A" APPLICATION

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Two 4-cell No. 30 Supercharged Denver "Sub-A's" handle 60-90 tons of minus 28 mesh coal sludge per hour at 20% solids. Flotation reduces ash content of sludge from 25-35% down to 13%, making it a marketable product. Grade of concentrate is maintained without any cleaning of rougher concentrate.

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Activities at Tombstone



The Shattuck-Denn Mining Company of Bisbee has commenced drifting in the Abril Mine at Tombstone. It is reported that considerable new machinery and equipment has been brought to the mine by the new operators.

New Large Compressor at Summit Mine

Two compressors of 315 cu. ft. per minute capacity and driven by a 135 hp. diesel motor have been installed at Summit Mine not far from Kingman, Ariz. This new installation is expected to double present production figures of 30 to 40 tons daily. The lessee and operator of the Summit-Alpha Mine is Ralph L. Langle of Los Angeles, with Russell E. Lord of Chloride as local manager.

Geophysical Prospecting Near Prescott

Ernest D. Foster, consulting engineer for the Foster Engineering Co., of Los Angeles, has completed a geological and geophysical survey of the Piedmont mine near Cordes. Reports are that the survey indicates a substantial zone of secondary enrichment and commercial leaching ore in this area.

Gold Area Reopened at Searchlight



A new vertical double compartment shaft is being sunk in the old M & M property, one of the great producers at Searchlight in the former boom days. Rich ore has been found close to the surface in this new location and Homer C. Mills, president of the Golden Dawn Mining and Milling and M. & M. Mining Co., has been in charge of this new operation. A new two-compartment shaft is also being sunk at the Blossom Mine and several carloads of ore have been shipped since last July 1 when the gold restrictions were lifted.

Placer Activities in Humboldt Area

Lauren S. Fish, president of the Eureka Hamburg Mining Co., located on Leonard Creek in northern Humboldt County, plans to operate the Anna Marie claims this coming summer. Operation of both placer and lode mines is anticipated and transactions have been completed for machinery and equipment at the operations. The placer plants have capac-



ity of 500 yds. daily and gravel washing will be carried on when water is available.

New Dredging Installation

The Natomas Company of California is preparing to install and operate a dragline dredge on the property of Greenan Placers, Inc., below Copper Canyon, one mile south of Battle Mountain. The dredge is already on the ground, having been moved from Oregon. A large bucket dredge may be installed at this locality later to operate on the deeper placer deposits. There have been placer operations in this region in the past, but never on a large scale.

Reconversion on Tungsten Property



The Bradley Mining Company's tungsten mine in the Yellow Pine district at Stibnite, Idaho, which has been producing practically 50 per cent of the tungsten mined in the United States during the war years, announces practical exhaustion of the tungsten deposit, and is re-converting its milling plant for the treatment of gold and antimony ores. The tungsten deposit was a "gift of the gods" to the United States. The company is now preparing for low-grade gold and antimony ore on a production basis of 2,000 tons per day. Production of tungsten ore will continue on a smaller scale, from an-

other mine, the Ima, which the Bradley Mining Company recently purchased at Patterson, Idaho.

New Flotation Plant at Pine Creek

The Nabon Mining Company has constructed a modern 300-ton flotation milling plant at its property on Pine Creek, and is driving a 6,000-ft. crosscut tunnel which will open several veins at depths varying from 900 to 1,300 ft. While this work is under way the company will mill ore trucked from the upper workings.

Operations Suspended at Nine Mile Canyon

The Daylight Lease Company has suspended operations at the Interstate Callahan lead-zinc mine at the head of Nine Mile Canyon, north of Wallace, after producing a large tonnage of high-grade ore from a pocket in the Nipsic vein.

Howe Sound Developing Cobalt Property

The Howe Sound Mining Company is developing a gold-cobalt-copper deposit in the Blackbird mining district in Idaho, about six miles below Forney, in Lemhi County. The property is said to have one of the largest known deposits of cobalt mineral in the United States.

New District Reported


Alfred L. Anderson and Warren R. Wagner, geologists connected with the University of Idaho School of Mines, report the discovery of a new lead-zinc mineral district in the Purcell Mountains in Boundary County, Idaho, 14 miles northeast of Bonners Ferry. It is known as the Noyie Yaak district and is reported by the geologists to have the same type of mineralization as the Coeur d'Alene district. The only producing mine in the district at the present time is the Regal mine of the Silver Crescent Mining Company, which is producing about 90 tons of lead and 30 tons of zinc concentrates monthly.

King Mining Co. Increases Holdings

The Gertie Mining Company and the Marsh Mines Consolidated Company were recently sold to the King Mining Company and the stock is now transferable on a basis of five shares of the old company stock for one share of King company stock. The King Mining Company, one of the Day group, is now one of the largest owners of mining claims in the Coeur d'Alene district. Its hold-

ings comprise a continuous group of patented and unpatented mining claims from Burke to Larson, east of Mullan, a distance of approximately eight miles.

Developments in Shasta County




The Coronado Copper & Zinc Co., of Los Angeles, has started an extensive development program at the old Afterthought zinc-copper mine at Ingot, not far from Redding. This mine is a zinc property which was started in 1880 and has two 400-ft. shafts, opened by a tunnel. Fortunately the property has been maintained in good condition so it is anticipated that actual development work will be under way shortly.

Excellent Grade Bentonite Developed


In Kern County work on the Bentonite Knoll group of claims in the Rademacher district has indicated a substantial deposit of good grade bentonite from 3 to 9 ft. in depth and capped by a shallow deposit of pumice. The property is owned by Grover Kane, G. N. Hadley and Bert Johnson, of Randsburg. The work on the property consists of a series of open cuts and shafts.

Silver Lead Property Expanding Operations



Bonanza Lead Company is planning to expand operations starting this spring on properties held under lease and option at Colville, Wash. Concentrates are being shipped to the Bunker Hill Smelter at Bradley, Idaho. The property is equipped with a 100-ton concentrating plant. The company is a co-partnership with Ira M. Hunley and C. B. Gibbs of Colville in charge.

Increased Activities in Alaska Placers



Preparations are being made for the resumption of mining on various properties throughout Alaska that have been idle since 1942. Reports from Fairbanks, Dawson, and Seattle indicate that caterpillar tractors and bulldozers are being shipped into Alaska in anticipation of reopening of gold placer mining throughout the territory. Several small dredges will resume operations and Diesel oil and pipe are being

shipped to Alaska to be available for summer operations.

Sunshine Mining to Operate in Yukon

The Sunshine Mining Company will begin operations this summer in the Yukon. Frank S. Friedle, field manager of the Sunshine Mining Com-

pany operations in the territory, estimates that 200 tons of freight are going over the highway from Fairbanks to their property at Glacier Creek. This season the Sunshine Company will confine its operations to stripping with a crew of 20 to 25 men and during this coming winter, a dredge the company purchased before the war will be moved into the placer ground.

Wheels of Government

(Continued from page 72)

The operators have stated fully to the miners the status of the industry's market losses to competitive fuels, pointing out that price is the biggest handicap that the coal industry encounters in this competition. It has also been fully explained that savings due to greater mechanization have gone almost entirely into wages. The operators have offered pay increases under the Government's wage-price policy and are willing to consider joint contributions to a reasonable fund to mitigate hardships of mine accidents. The operators stress however that in any contract which is made there must be suitable guarantee by the International Union against wildcat strikes.

Matters appeared to have reached an impasse this week with John Lewis' announcement that "there will be no discussion of wages and hours in the Joint Conference until the major questions of safety in the mines and a welfare fund to alleviate some of the human agony in the industry are resolved." To this Petrillo-like demand the Operators Negotiating Committee replied that Lewis is repeating himself in demanding "a blank check that would amount to 50 or 60 millions of dollars yearly, before he will even discuss his demands for wages and hours affecting the 400,000 workers he represents." The committee also stated that Lewis is attempting to force the operators to approve abruptly by contract, terms which would substitute rulings of the U. S. Bureau of Mines over State mining laws, "even though Congress has refused to do that very thing." Criticizing Lewis' tactics, the operators then pointed out that, "after gaining these two points, he generously says he will advise what the rest of his bill will add to the cost of producing coal—knowing full well that all of this cost, including his royalty taxation, imposed without representation, will have to be placed upon the shoulders of the consumers."

Silver Sales

The Treasury silver sales "rider" on the Treasury-Post Office bill will be the subject of further hearings be-

fore the Senate Appropriations Subcommittee on April 9. Hearings were held by the subcommittee on March 11 at which representatives of silver consumers, including photo-film, flatware, hollow-ware and jewelry manufacturers, testified that they were unable to purchase silver. Under close questioning the consumer witnesses stated that their industry had 24,745,000 ounces on hand. At the hearings April 9 opponent witnesses to the House rider, including western metal producers as well as Senators and Representatives from Western States, will protest against sales of Treasury silver at 71.11 cents and insist that the metal be issued in the form of money at \$1.29 an ounce.

Meanwhile Senator McCarran has introduced S. 1943, which provides that for one year the Director of the Mint shall retain 20 per cent of newly-mined domestic silver received, as seigniorage, and that the remaining 80 per cent shall be coined into standard silver dollars to be delivered to the owner or depositor of the silver. At the end of one year the full monetary value of such silver, less deductions for brassage, coinage and other mint charges, shall be paid. The tax of 50 per cent of profits derived from the sale of silver bullion would be repealed.

The McCarran bill also provides that sales of Treasury silver for manufacturing uses would be authorized at not less than \$1.03432 per ounce for a period of one year, and thereafter at not less than the legal monetary value; with the proviso, "That no such sale shall be made unless the purchaser has certified in writing, and the Secretary of the Treasury is satisfied, that such purchaser has made all reasonable efforts to purchase in the open market, and notwithstanding such efforts has been unable so to purchase, sufficient silver to meet his reasonable immediate requirements; and no such sale shall be made in an amount greater than the amount of silver necessary to enable such purchaser to meet his reasonable immediate requirements." This bill is now in the Senate Committee on Banking and Currency where it will be considered jointly with the Green bill providing sales of Treasury silver to manufacturers at not less than 71.11 cents per ounce.

MANUFACTURERS FORUM

M.S.A. Redi-Heat Block for Industrial First Aid

The M.S.A. Redi-Heat Block, a new rapid and safe emergency source of heat for first aid use, employing no liquids of any kind, has now been made available by Mine Safety Appliances Company, Pittsburgh, Pa. It is entirely self-contained and always ready for instant use, requiring only one minute to reach top heat. Wrapped in a towel or blanket, the block maintains its temperature for



approximately one hour, and furnishes completely safe heat for emergency treatment of victims of shock or other injury. Weighing only 22 ozs. and measuring only 3½ in. x 4 in. x 1½ in., the Redi-Heat Block fits conveniently into industrial first aid kits, cabinets, dispensaries, and field station units.

Complete information will be furnished on request to the company.

Shortest Transformers for Mines

Transformers that can be suitably used in coal mines need to have good voltage regulation. Often long runs of low-voltage cables are extended from mine-slope entries back to the hill where conveyor motors are located. In many cases, the voltage drops at the load by as much as 60 per cent.

To improve cable-voltage drop, a dry-type air-insulated transformer designed by Westinghouse transformer engineers can be located in

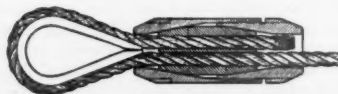
the mine relatively close to the working face. This transformer is semi-portable and suitable for skidding through passages of low height by means of a common hoist. The unit is a complete power-center, having high-voltage plug entrance cables and low-voltage De-ion circuit breakers. High-temperature silicone-bonded insulation is used on the windings. The case, bushings, and fittings are made tight by use of metallic seals. It is designed for location in the common horizontal entry mine without the use of expensive vaults for which space is seldom available. The use of plugged-type cable connections makes it easy to move the unit from one location to another in the mine. This transformer should prove to be of great value in thin-seam mines and effect considerable increase in their output.

A 150-kva, three-phase, 2,400- to 240-volt power-center is only 25¼ in. tall and weighs 3,600 lbs.

Revolutionary Features Claimed For Wire Rope Clamp

A new wire clamp called Cabl-Ox has been developed by the Nunn Manufacturing Company, 2125 Dewey Ave., Evanston, Ill., as the answer to the old problem of securing wire rope in its many applications.

The Cabl-Ox clamp incorporates a new and exclusive wedging action in its component parts. This is the feature of Cabl-Ox which makes it pos-



sible to hold loads in excess of the tensile strength of the rope used. The unit is alloy steel, cadmium plated for weather protection, streamlined for neat appearance and freedom from obstruction. It is made in all standard sizes from 1/16-in. to ¾-in. Every industry in which wire rope is used for hoisting, hauling, drilling, guying, control cables, etc., will be interested in the absolute security, speed of assembly and economy in use. Complete information will be furnished upon request to the company.

Cast-Welded Dipper for General-Purpose Work

Many operators of earth-moving equipment will be interested in the new general-purpose cast-welded dipper recently announced by Electric Steel Foundry of Portland, Oreg. The new dipper is offered in a size range from ¾-cu. yd. capacity to 5-yd. and larger sizes on special order.

Lighter weight is the principal advantage of the cast-welded dipper and it is gained through the use of man-



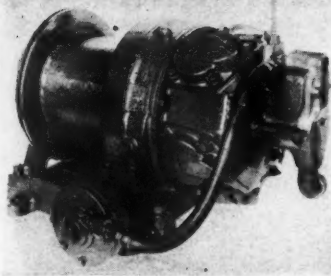
ganese steel castings in the parts subjected to the most wear and shock, while the back and sides of the dipper make use of fabrication and welding techniques which the war did so much to promote and develop.

A great many of these dippers have been built for coal stripping and loading operations and are in service in many parts of the country. Bulletin 157, giving full information will be furnished upon request to the company.

New Safety Feature on Hoist Announced by Gardner-Denver Co.

An important safety feature on a hoist for use with timber, steel, powder and other supplies, has just been announced by the Gardner-Denver Company, Quincy, Ill. This feature, available on the Gardner-Denver Model HKK Hoist, consists of a spring-loaded brake, which is held in the off-position by air pressure. If the air supply fails for any cause, if an air hose ruptures or a line breaks, this brake is automatically applied. The brake is automatically released when the throttle valve is moved in either direction. The throttle valve will automatically return to the neutral position when released by the operator.

This new brake is positive and en-



tirely automatic. It will hold in suspension any load within the capacity of the hoist and cannot be released until air is admitted to the motor and the load is picked up.

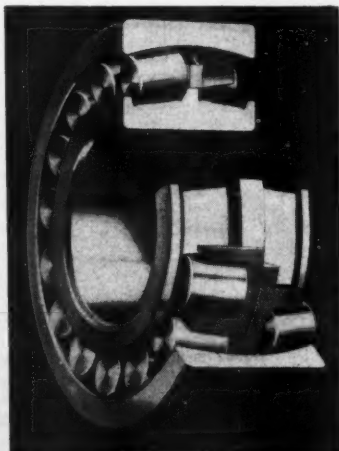
The Gardner-Denver Model HKK Single-Drum Safety Hoist has a rated vertical lift of 2,000 lbs. at 80 lbs. air pressure.

New Moisture-Proof Tamping Bag

A new, heavier, chemically-treated paper that is moisture-proof has been developed for the Tamping Bag Company of Mt. Vernon, Ill. It allows longer underground storage of tamping bags, both filled and unfilled, in mines faced with damp or wet conditions without rupture or breakage of the bag.

Spherical Roller Bearing

To fulfill a widespread need in many industries, the Bantam Bearings Division of the Torrington Company, South Bend 21, Ind., announces the production of a self-aligning spherical roller bearing. This is a new addition to their line of anti-friction bearings, which already in-



cludes straight roller, tapered roller, needle and ball.

This new spherical roller bearing is specifically adaptable to heavy-duty performance in a wide range of equipment. Of particular interest are the varied applications to machin-

ery used in paper mills, steel mills, oil production, mines and quarries.

The new bearing will be produced in a full range of sizes from 1.5748-in. bore upward. It is fully described in Bulletin 100A, available upon request to the company.

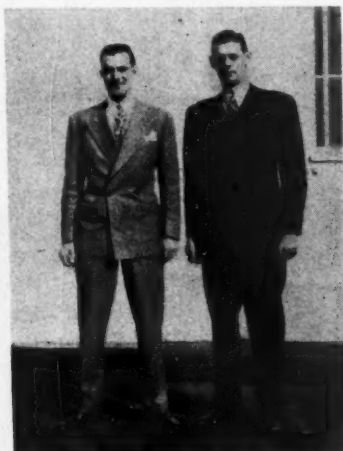
—Announcements—

L. E. Osborne, senior operating vice president of the Westinghouse Electric Corporation, has announced the appointment of John K. Hodnette as manager of the company's transformer division, at Sharon, Pa. Mr. Hodnette, who has been engineering manager in that division for the past six years, assumes the duties formerly held by H. V. Putman, company vice president in charge of the transformer division, who died last January 16.

Outstanding among many transformer improvements for which Mr. Hodnette is responsible and for which he has been granted patents, is the completely self-protected distribution transformer which assures protection against lightning and outages, and minimizes service interruptions.

The Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., has announced the appointment of I. C. Smith to the position of chief engineer of the company.

Mr. Smith has had wide experience in both the electrical and mechanical aspects of electric motor design.



James R. Neal (left) and Edward M. Bonette are new additions to the sales staff at Cummins Service and Sales, 1661 McGarry Street, Los Angeles. Specializing in transportation and industrial engine installations, Bonette will cover territory north from Los Angeles to Santa Maria. Neal will be in charge of the district south to San Diego.

The Euclid Road Machinery Co., Cleveland, Ohio, announces three recent additions to the Euclid organization:

H. W. Hiscox has been appointed sales representative for Virginia and West Virginia and will assist the Export Department with Washington contacts. He was formerly with B. F. Goodrich Company as district manager in the Southeast.

Recently discharged from the armed forces where he served as Captain in the Air Corps, George M. Perry has joined the Export Department as assistant to P. H. Malenchini, manager of the department.


Thomas A. Cantrell, a Major in the Engineer Corps prior to joining Euclid, has been placed in charge of field engineering.

CATALOGS AND BULLETINS

FLEXLASTICS. *Raybestos-Manhattan, Inc.,* Manhattan Rubber Division, Passaic, N. J. Bulletin No. 6885 describes synthetic rubber material known as Flexlastics, compounds composed of natural and synthetic rubber having advantages for certain specialized uses. The folder is illustrated with pictures of typical installations, testing equipment and special products.

LOCOMOTIVES. *The Jeffrey Manufacturing Company,* Columbus 16, Ohio. Catalog No. 790 is a two-color 48-page booklet with photographs of about 30 different types of electric locomotives, including storage battery operated and trolley types. The last 15 pages of the catalog are devoted to structural details such as frames, bumpers, lights, journal boxes, axles, wheels, motors, controls, etc. A convenient table of haulage capacities with drawbar pull is given on page 44 of the catalog.

ORE DRESSING. *American Cyanamid Company,* 30 Rockefeller Plaza, New York 20, N. Y. Ore Dressing Notes No. 14 is a 47-page booklet containing detailed information on the Heavy-Media Separation Process with descriptions and diagrams of various new metallic and non-metallic installations now in commercial operation. Ores of zinc, lead, zinc, iron, fluor spar, tin, magnesite and garnet are discussed and the separations diagrammed and described. Results of laboratory tests on other ores are also described. This booklet might well be considered as a text on the subject of Heavy-Media Separation.

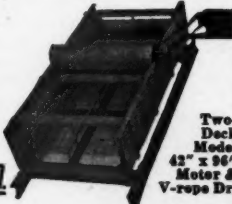


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**Bigger Loads...
More Trips**

with

CUMMINS
Dependable
DIESELS



CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Coal Economy

...is achieved
through the use of
SPECIFIC GRADES



Crucible Fuel Division, Crucible Steel Company of America, Crucible, Pennsylvania, uses two 48" R & S Hydro-Separators, two 7' and one 20' R & S Hydrotators to produce processed coal for metallurgical use at the rate of 400 tons per hour.

Run-of-mine capacity is 500 tons per hour. Raw coal screen-sizing, hand picking and crushing of the plus 4" material proceeds at this rate until 4" material is stored in a 2000 ton concrete bin. Further sizing to 4" x 1" and 1" x 3/8" for the coarse coal washing in R & S Hydro-Separators and 3/8" x 0" for the fine coal washing in R & S Hydrotators, is at the rate of 400 tons per hour. The blended and washed coal is reassembled for shipment in river barges or in railroad cars.

WISE COAL CONSUMERS

use the grade of coal particularly adapted to their specific requirements—

SMART PRODUCERS

clean and grade their coal to fit the specific requirements of their customers—or for their own use.

R & S HYDRO-SEPARATORS

Hydrotators—and Stump Air Flow cleaners are designed for better processing to meet these consumer demands. R & S descriptive bulletins should help you. We will be glad to send them to you upon request. Bulletin No. 161—R & S Tandem Hydro Separator; Bulletin No. 162—R & S Hydrotator; Bulletin No. 163—R & S Stump Air-Flow Cleaner.



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